U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Draft

Oregon State Office

November 1982

Eugene Timber Management

Environmental Impact Statement

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

District Office
P.O. Box 10226
Eugene, Oregon 97440

Enclosed for your review and comment is the Eugene Timber Management Draft Environmental Impact Statement (DEIS). The statement analyzes the impacts that would result from the proposed timber management plan and the nine alternatives. The purpose of the statement is to disclose the probable environmental impacts and to assure that these impacts are considered along with economic, technical and other factors in the decisionmaking process.

The alternatives presented result from the "scoping" phase of the environmental analysis procedure, which included an April 1982 public meeting that addressed possible actions and relevant issues for study in the EIS. A major issue of BLM's timber management throughout western Oregon has been concern regarding which uses of the forest land base were authorized under the terms of the O&C Act and subsequent legislation. Following a major legal review and analysis of these authorities, BLM Director Robert Burford issued in July a set of management criteria defining the agency position for the O&C lands. The proposal developed from application of this criteria (see Appendix B) is identified in the statement as BLM's preferred alternative (Alternative 4).

In reviewing the analysis of the proposed action and alternatives, readers should keep in mind that the EIS (draft or final) is not a decision document. Final decisions will be made after the close of the final EIS period.

Comments concerning the adequacy of this statement will be considered in the preparation of the final environmental impact statement. The comment period will end January 24, 1983. During the review period we will hold a workshop and an informal public meeting. Dates, locations and times will be announced prior to each meeting.

This draft may be incorporated into the final EIS by reference only. The final EIS would then consist of public comments and responses and any needed changes in the draft. Therefore, please retain this draft EIS for use with the final.

Comments received after the close of the comment period will be considered in the decision process, even though they may be too late to be specifically addressed in the final environmental impact statement.

Your comments on the EIS should be sent to the Eugene District Manager at the address above.

Sincerely yours,

Dwight Patton
District Manager

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

Eugene Sustained Yield Units

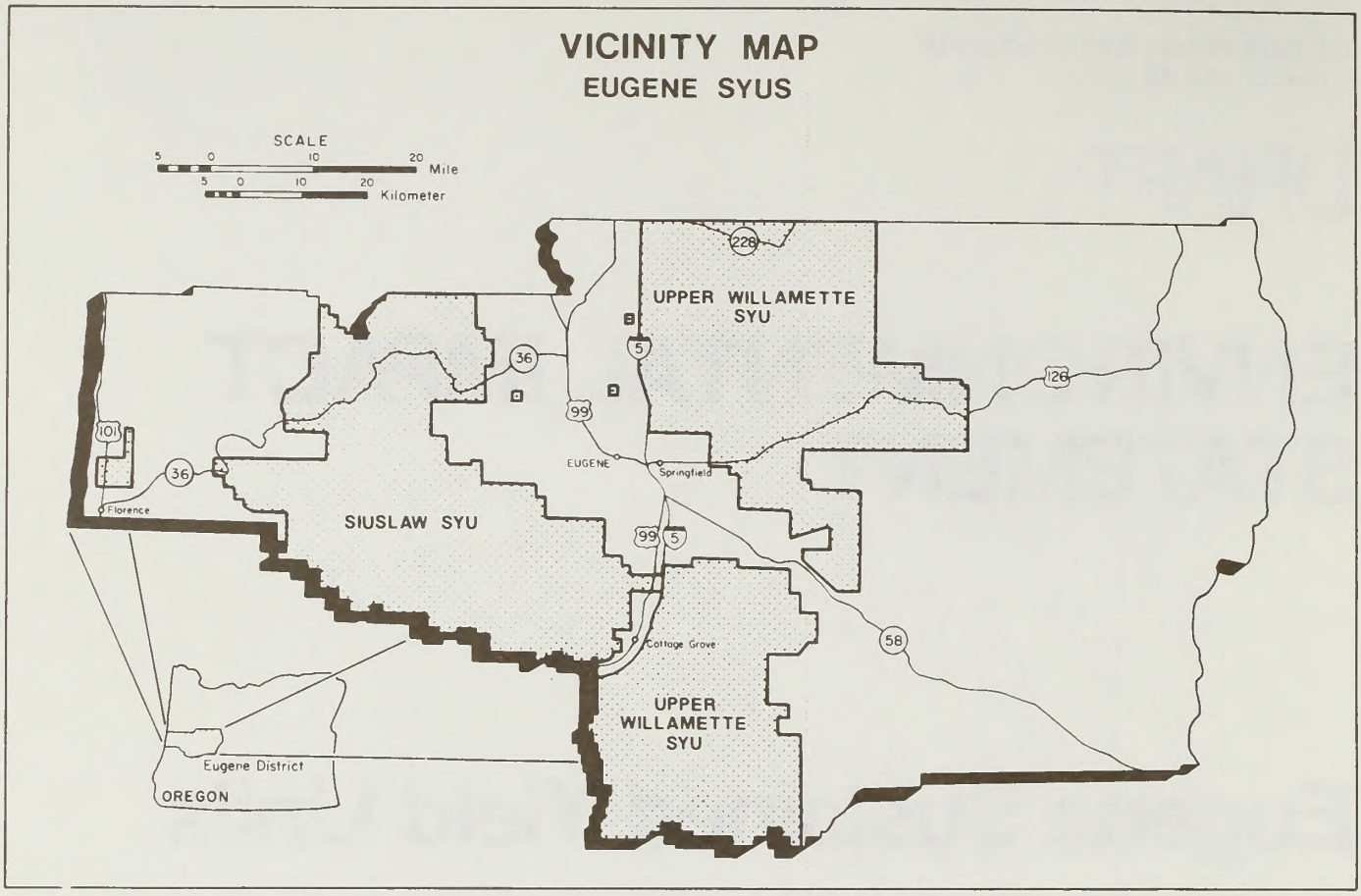
Ten-Year Timber Management Plan

Prepared by

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
1982

William D. Leavell
State Director, Oregon State Office

EUGENE PROPOSED TIMBER MANAGEMENT



Draft (x) Final ( ) Environmental Impact Statement

Department of the Interior, Bureau of Land Management

1. **Type of Action:** Administrative (x) Legislative ( )

2. **Abstract:** This EIS describes and analyzes the environmental impacts of implementing an updated 10-year (1984-1993) timber management plan for the 316,747 acres of public land in the Siuslaw and Upper Willamette Sustained Yield Units in the Eugene District, Oregon. The Bureau of Land Management is responsible for managing timber on public lands under the principle of sustained yield consistent with the protection of other resources. Ten alternatives are described and analyzed for environmental impacts. The alternatives analyzed include: 1) Maximum Timber Production with Even Flow Departure, 2) Maximum Timber Production, 3) Deferred Harvest, 4) Seral Stage Distribution, 5) East-West Corridor, 6) No Action, 7) Origional Proposed Action, 8) No Use of Herbicides, or Credit for Fertilization and Genetics, 9) Ecosystem, 10) Maximum Ecosystem with Withdrawal of Old Growth. Alternative 4 (Seral Stage Distribution) is the Preferred Alternative. Specific timber harvest, site preparation, reforestation, plantation protection, precommercial thinning, fertilization and control of competing vegetation. Significant environmental impacts of the preferred alternative include increased timber harvest and employment and reduced wildlife habitat diversity; soil erosion, landsliding and stream sedimentation; and smoke intrusion problems.

3. The draft statement is expected to be filed with the Environmental Protection Agency (EPA) and made available to the public on November 24, 1982. The comment period will be 60 days following transmittal to EPA.

4. **For further information contact:**

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SUMMARY

Introduction

This environmental impact statement (EIS) describes and analyzes the environmental impacts of implementing an updated 10-year (1984-1993) timber management plan for the Siuslaw and Upper Willamette Sustained Yield Units in the Eugene District, Oregon. Hereafter, the Sustained Yield Units will be referred to as the Eugene Sustained Yield Units or simply the SYUs. This EIS applies to actions proposed for the 316,747 BLM-administered acres within the combined SYUs. These are primarily revested Oregon and California Railroad (O&C) lands.

In accordance with the National Environmental Policy Act, this EIS identifies impacts on the natural and human environment associated with all alternatives. The EIS analysis is based primarily on data collected and analyzed through the Bureau planning system which included extensive public involvement. Seral Stage Distribution (Alternative 4), developed to meet new policy criteria for O&C lands, is the Preferred Alternative. Nine other alternatives have been identified, providing a wide range of options for review and consideration.

Alternatives

Timber harvest under all alternatives would be accomplished predominately by clearcutting, with some single tree selection. Intensive timber management treatments would include construction of logging roads, site preparation with burning, mechanical means and herbicide application, planting coniferous trees (including genetically improved stock), plantation protection, plantation maintenance and release with herbicides or manual means, precommercial thinning and fertilization. Alternative 8 excludes the use of herbicides. Approximately 21,500 acres would be withdrawn because of fragile soil and reforestation problems under all alternatives except Alternative 6.

Variables among alternatives include amounts of land allocated to timber production, types and amounts of intensive management practices, harvest scheduling and constraints on timber harvest to benefit other resource values. The alternatives analyzed are:

1. Maximum Timber Production with Even Flow Departure. All commercial forest lands would be allocated for intensive timber production except those managed to protect bald eagles or existing developed recreation sites, and those withdrawn (Fragile) because they would be incapable of

undergoing harvest without significant site degradation. Streamside buffers for water quality would be provided consistent with the Oregon Forest Practices Act. This alternative would allocate 286,039 acres of commercial forest land to intensive timber management. Under this alternative, an 8 million board feet (MM bd. ft.) increase to an annual timber sale program of 249 MM bd. ft. would occur during each of the first two decades. However, annual timber sales in subsequent decades (third and beyond) would fall as low as 236 MM bd. ft.

2. Maximum Timber Production. alternative would be the same as Alternative 1 in the size of the commercial timber base and in the type of management practices, but would not depart from even flow. Thus, there would be no subsequent decline in harvest after the second decade. This alternative would produce an annual timber sale program of 241 MM bd. ft.

3. Deferred Harvest. This alternative would protect from harvest during the plan decade all lands that would be protected under the Original Proposed Action (Alternative 7). However, the allowable cut would be computed as though no land were to be managed on an extended rotation of 350 years to maintain old growth forest values for wildlife habitat diversity. This alternative would provide a high level of timber production in the next decade while retaining 18,886 acres of the commercial forest base in old-growth stands for a decade of research on old-growth ecology. It would allocate 276,331 acres of commercial forest land to intensive timber management with an additional 360 acres under constrained timber production and would provide an annual timber sale program of 234 MM bd. ft.

4. Seral Stage Distribution (BLM Preferred Alternative). This alternative seeks a high level of timber production while preserving essential representative and functioning blocks of older seral stages. Large blocks would be 300-500 acres in size, of which at least 50 percent would be old growth (196 years plus) and the remainder in mature timber (116-195 years). Corridors consisting of 50-100 acre small blocks spaced at 1 to 1-1/2 mile intervals would be established between large blocks where possible. In the Eugene SYUs, seven large blocks and 20 small blocks totaling 3,987 acres of mature and old-growth timber would be withdrawn from the timber production base. An additional 10,071 acres of commercial timber land would be withdrawn to protect riparian zones (along third order and larger streams), bald eagles, Research Natural Areas, and sensitive botanical species. The annual timber sale program would be 230 MM bd. ft. for the 10-year period.

5. East-West Corridor. An east-west linkage of diversified wildlife habitat between National Forest in the Coast and Cascade Ranges, and the proposed systems of wildlife habitat corridors identified in South Coast-Curry final and Roseburg draft EISs would be provided. This corridor would provide a Eugene component of a regional system of habitat diversity for spotted owl preservation and for other wildlife. A variety of seral stages would be distributed so as to prevent isolation of specialized habitats and to preserve opportunities for genetic interchange. Riparian zones along third order and larger streams would be protected. It would allocate 265,416 acres to intensive timber management and about 10,900 acres would be managed on an extended rotation of 350 years to create the corridor. The annual timber sale program would be 223 MM bd. ft.

6. No Action (No Change). A required alternative in the EIS, this would constitute a continuation of the present annual timber sale program of 219 million board feet of timber per year. It would continue the intensive management practices and constraints identified in the 1972 allowable cut determination. Management for other resources would generally be on a case-by-case basis, rather than through a system of district-wide land-use allocations.

7. Original Proposed Action. This original proposed action emphasizes a high level of timber production while managing for a variety of natural values and recreational opportunities. It would yield an annual timber sale program of 213 MM bd. ft. from an intensive timber base of 253,085 acres and an extended rotation of 350 years of an additional 23,606 acres. Approximately 9,500 acres would be withdrawn to protect wildlife, watershed and fisheries values. Timber management and forest development practices would include measures to reduce impacts to wildlife habitat in early forest seral stages.

8. No Use of Herbicides or Credit for Fertilization and Genetics. This alternative is similar to Alternative 7 in timber base and treatments, except that herbicides would not be used. It would provide for continued use of fertilizer and planting of genetically improved trees, but the allowable cut computation would not take credit for anticipated growth increases. Vegetation control by biological, mechanical or manual methods would be prescribed to the same dollar level of investment as used for herbicides and other vegetative management practices in the proposed action. This alternative would produce an annual timber sale program of 190 MM bd. ft.

9. Ecosystem. This alternative emphasizes the protection and enhancement of natural values, while providing for a moderate level of timber production. Approximately 85,000 acres would be managed on extended rotations of 350 years to provide a high level of habitat diversity. Approximately 36,000 acres of the SYUs would be withdrawn to protect riparian zones, including those adjacent to stream orders 1 and 2. This alternative would provide a high level of protection for visual resources and a wide variety of recreational opportunities, including an allocation for primitive recreation in the Windy Peak area. It would yield an annual timber sale program of 133 MM bd. ft. from an intensive timber base of 135,026 acres and a constrained timber production base of 114,553 acres.

10. Maximum Ecosystem, with Withdrawal of Old Growth. This alternative would provide maximum protection of wildlife habitat, water quality, visual resources and other natural values. About 101,600 acres would be managed primarily for wildlife habitat values through extended rotation management of 350 years. Approximately 70,500 acres would be withdrawn from timber harvest to protect riparian zones and old-growth blocks. This alternative would provide an annual timber sale program of 71 MM bd. ft. from an intensive timber base of 58,511 acres and a constrained timber production base of 156,614 acres.

Environmental Consequences

Air Quality

The major impact on air quality would be from slash burning. Particulate emissions range from 918 tons to 2,505 tons per year.

Soils

Impacts to soils are mainly due to road construction, landslides and compaction. Alternative 1 has the greatest long- and short-term impacts while Alternative 10 has the least. Acres lost from production range from 2,491 under Alternative 10 to 4,471 under Alternative 1. Less significant impacts include nutrient losses, dry ravelling and topsoil removal.

Water Resources

Sediment yield would increase under Alternatives 1 and 2, decrease under Alternatives 3 to 10. Water yield increases are expected under Alternatives 1 to 7, decreases under Alternatives 8, 9 and 10. Water temperature would increase under Alternatives 1, 2 and 6.

Vegetation

Alterations to plant community structure and longevity would be the most significant impacts to vegetation on lands scheduled for timber harvest. Acres scheduled for timber harvest would range from 57,433 under Alternative 1 to 18,903 under Alternative 10. Mature and old growth forest communities would be converted to early successional stage communities as slow-growing timber stands are replaced by young, fast-growing stands. Diversity and complexity of plant communities would diminish as maximum growth of commercial conifers is emphasized. Changes in plant communities and habitat could eliminate some plant species. Plant habitat altered by herbicides would increase under all alternatives except 8, 9 and 10. Permanent road construction during the decade would eliminate vegetation from public land, ranging from 2,107 acres under Alternative 1 to 1,626 acres under Alternative 10.

Animals

In all alternatives except 9 and 10, there would be significant long-term adverse impacts to some animal populations due to a decrease in habitat diversity and, in particular, a reduction in the mature and old-growth components of the forest. Simplification of habitats due to intensive forest management practices would add to this impact.

Harvest in riparian zones would have adverse impacts to wildlife, particularly in Alternatives 1, 2 and 6. Increases in sediment yield and/or water temperature in Alternatives 1, and 2 would negatively impact fish.

Snag-dependent wildlife would be greatly reduced in all alternatives but 9 or 10. In the long term, elk numbers would decline in all alternatives.

There would be no known adverse impacts to existing habitat used by any species listed by the Federal Government as threatened or endangered. Although failure to provide alternative nest site could have an adverse impact to bald eagles in Alternative 1-6. The northern spotted owl, listed by the State of Oregon as threatened, would be adversely impacted in varying degrees by all alternatives.

Recreation

The impacts of timber management operations would be both beneficial and adverse, depending on the recreational experience desired. Visitor use increases or reductions may occur in certain areas as a result of impacts to specific recreational experiences.

Alternatives 1, 2, 5 and 6 would serve to adequately meet increasing demand for motorized recreational vehicle use and some dispersed use areas. However, demand associated with many other activities would not be met under these alternatives.

Alternatives 4, 7, 8, 9 and 10 would serve to meet most recreational needs. In the long term, however, significant elk population decreases under all alternatives except 10 would result in lower hunting success and a corresponding reduction in elk hunter

use. Under Alternatives 1 and 2, declining fish populations would result in a lower fishing success and some decrease in related angler use. A lower desirability of BLM-administered lands for fishing and elk hunting would occur.

Cultural Resources

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under all alternatives. Undiscovered cultural sites would be susceptible to considerable alteration and damage. Once a site is found, however, mitigation measures will be instituted to minimize or avoid damage. Under all alternatives, sites identified before logging would be managed to protect scientific and/or interpretive values.

Visual Resources

Under Alternatives 9 and 10, visual resource conditions (scenic quality) would improve. Adverse visual impacts under Alternatives 3, 4, 5, 7 and 8 would be moderate. Some highly scenic and/or sensitive areas would be protected.

Under Alternatives 1, 2 and 6, adverse visual impacts would be high with no protection provided for certain highly scenic and/or sensitive areas.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACEC) designation would provide guidelines to help achieve resource protection in those areas designated. Under Alternatives 3, 4, 5, 7, 8, 9 and 10, no impacts would occur to those seven areas qualified for ACEC designation. Under Alternatives 1, 2 and 6, the Fox Hollow, Camas Swale and Mohawk areas may be adversely impacted if they are not designated or do not receive other protective management.

Special Areas

Under Alternatives 3, 4, 5, 7, 8, 9 and 10, no impacts would occur to the four potential Research Natural Areas and three Environmental Education Areas. Under Alternatives 1, 2 and 6, the seven sites with natural or environmental education values may be adversely impacted if they do not receive protective management.

Economics

Compared to timber harvest levels in Lane and Linn Counties from 1978 - 1981, Alternatives 1 through 8 would support employment in the timber industry and total local employment and earnings. The preferred alternative would provide for an increase of 325 timber industry jobs and 952 jobs in total. The greatest increase in jobs would be attributable to Alternative 1, yielding 466 timber industry jobs and 1,345 total jobs. Alternative 10 would result in a net loss of 884 timber industry jobs and 2,230 total jobs. Public revenues would be increased in Alternatives 1 through 8.

Compared with continuation of the current timber management program, Alternatives 1 through 5 add economic activity. In this comparison, the preferred alternative could yield an additional 86 timber industry jobs and 242 jobs in total. At the extremes, Alternative 1 could stimulate up to 855 new jobs while Alternative 10 could contract the local economy by 3,224 jobs.

Public revenues would be increased or maintained for Alternatives 1 through 5 and decline for Alternatives 7 through 10.

Social

Significant social effects resulting from the economic outcomes of BLM policies would be expected only if Alternatives 9 or 10 were implemented. Under those alternatives adverse social impacts would result from reduced employment opportunities and reduced public revenues.

Since opinions about herbicide use are sharply divided, each of the alternatives will affect some people's attitudes. Based on an opinion survey, it appears that more people would be satisfied by one of the alternatives that would provide a variety of forest uses and opportunities (such as numbers 3 through 8). The alternatives that strongly emphasize one or two resource uses (such as 1, 2, 9 and 10) would satisfy fewer people and would be divisive.

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CHAPTER 1 DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

PURPOSE OF AND NEED FOR THE ACTION

The Bureau of Land Management (BLM) proposes to implement, beginning October 1, 1983, an updated 10-year timber management plan for the Siuslaw and Upper Willamette Sustained Yield Units in the Eugene District, Oregon (Figure 1-1, folded maps in the back cover pocket). Hereafter, the Siuslaw and Upper Willamette Sustained Yield Units will be referred to in this document as Eugene Sustained Yield Units (SYUs). These are primarily revested Oregon and California Railroad (O&C) lands. In accordance with the National Environmental Policy Act (NEPA), this EIS identifies impacts on the natural and human environment associated with the proposed action and alternatives. The 10-year timber management plan for the two SYUs provides direction for management of these lands as required by the acts mentioned below.

The Bureau's principal authority and direction to manage the O&C grant lands is found in the O&C Act of 1937 (50 Stat. 874; 43 U.S.C. 1181a., et seq.). Under this Act, O&C lands classified as timberlands are to be managed under sustained yield principles in order to provide a permanent source of timber supply, watershed protection, stream flow regulation and recreational facilities. Intermingled public domain lands were brought under sustained yield

management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except certain disposal acts. Withdrawal was completed by Public Land Order 5490 (40 FR 7450 (1975)). In addition, many activities of the BLM are governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 43 U.S.C. 1701). This law, often referred to as FLPMA, established policy for BLM administration of public lands under its jurisdiction.

Not withstanding any provision of FLPMA, in the event of conflict with or inconsistency between FLPMA and the O&C Act of August 28, 1937 (50 Stat. 874; 43 U.S.C. 1181a-1181j), insofar as they relate to management of timber resources and disposition of revenues from O&C lands and resources, the latter Act shall prevail.

During the planning process, criteria (Appendix C) were used to evaluate alternatives and select a proposed land-use allocation alternative. The results of this evaluation, combined with public input, produced the original proposed land use alternative, Alternative 7 in this EIS.

During an EIS scoping meeting held in Eugene, Oregon (April 5, 1982), participants were asked to identify issues and alternatives to be addressed in this EIS. Chapter 1 includes alternatives identified during scoping and considered appropriate for full analysis. Alternatives identified but not considered appropriate for full analysis, and the rationale for these determinations, are discussed in Appendix A. The use of suggestions received at the scoping meeting in the development of the EIS alternatives is summarized.

Management criteria to be used in developing plans for BLM-administered forest lands in western Oregon were approved by the Assistant Secretary of the Interior in July 1982. A copy of these criteria are included in this EIS in Appendix B. To respond to these management criteria, an additional alternative has been included in the EIS and is designated BLM's Preferred Alternative (Alternative 4).

The alternatives identify various timber harvest levels, management practices and design features to protect the land and other resources. This information is described in detail in the remainder of this document.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

Planning for the Eugene Sustained Yield Units (SYUs) focused on the 316,747 acres of public land administered by BLM. Approximately 93 percent of the Eugene District's land falls in Lane County with the remaining tracks scattered in Linn, Benton and Douglas counties.

Appendix C presents a discussion of the planning process and inventory methods used to arrive at the timber production base, allowable cut determination and other land use allocations. Acreages for land use allocations by alternative are shown in Appendix C, Table C-2.

There are 10 alternatives including the Preferred Alternative (Alternative 4) and the Original Proposed Action (Alternative 7) for which impacts will be analyzed in Chapter 3:

1. Maximum Timber Production with Even Flow Departure (Max./EFD)
2. Maximum Timber Production (Max. Tbr.)
3. Deferred Harvest (Def. Har.)
4. Seral Stage Distribution (S.S.D., The Preferred Alternative)
5. East-West Corridor (E-W Cor.)
6. No Action
7. Original Proposed Action (O.P.A.)
8. No Use of Herbicides or Credit for Fertilization and Genetics (No Herb.)
9. Ecosystem (Eco.)
10. Maximum Ecosystem with Withdrawal of Old Growth (Full Eco.)

For each alternative, a sustained yield harvest level (allowable cut) has been calculated based on the timber production base (see Glossary) of each SYU and the total displayed. All allowable cut computations are made in cubic feet and converted to Scribner board feet equivalence for the first decade. There is no surplus inventory (see Glossary). Variables between alternatives include amounts of land allocated to timber production, types and amounts of intensive management practices and constraints on timber harvest to benefit other resource values. These relationships are displayed in Table 1-1. Treatments and design features applicable to each alternative are discussed in the Forest Management Treatments and Design Elements section of this chapter.

All harvest levels shown in Table 1-1 are computed on the respective combinations of intensive and constrained timber production bases. Table C-2 (Appendix C) displays the breakdown by category and alternative. On areas allocated to constrained timber production (see Glossary), minimum harvest ages (MHA) vary to recognize specific wildlife diversity and visual resource management (VRM) considerations. The minimum average diameter of trees available for final harvest in the intensive timber production base would be 12 inches diameter breast height (dbh). This size is normally reached at age 40 in the Eugene SYUs. The timber production base, for all alternatives except Alternative 6, excludes fragile site and reforestation problem withdrawals (approximately 21,500 acres) and a minimum of 210 acres of commercial forest land withdrawn to protect certain natural and cultural resources. Appendix C explains these withdrawals in more detail.

Alternative 1 - Maximum Timber Production with Even Flow Departure

Except for protection of known federally listed threatened and endangered species and existing recreation, fragile and problem reforestation sites, all commercial forest land would be allocated to the intensive timber base (Appendix C, Table C-2). Streamside buffers for water quality would be provided consistent with the Oregon Forest Practices Act. However, protection for riparian zones, northern spotted owls, other wildlife habitat, visual and other resource values would not be provided.

Under this alternative, an 8 MM bd. ft. increase over the even flow level would occur during each of the first two decades. However, the harvest level in subsequent decades (third and beyond) would fall as low as 236 MM bd. ft., 5 MM bd.ft. below the even flow sustained yield level. The annual timber sale program for the 10-year period would be 249 MM bd.ft.

Table 1-1 Comparison of Alternatives by Treatment - First Decade

	Alt. 1 Max/EFD	Alt. 2 Max. Tbr.	Alt. 3 Def. Har.	Alt. 4 S.S.D.	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Intensive Timber Production Base [1]	286,039	286,039	276,331	271,831	265,416	294,695	253,085	253,085	135,026	58,511
Constrained Timber Production Base [1]	0	0	360	360	11,275	0	23,606	23,606	114,553	156,614
Annual Timber Sale Program										
Total Million bd. ft.	249	241	234	230	223	219	213	190	133	71
Total Million cu. ft.	39.09	37.77	36.73	36.12	35.04	34.39	33.44	29.84	20.80	11.02
Treatments[2]										
Transportation System (miles;acres)										
New Construction [3]	351;2,107	351;2,107	339;2,031	336;2,015	320;1,921	334;2,002	339;2,031	339;2,031	351;2,103	271;1,626
Reconstruction	351;0	339;0	330;0	324;0	314;0	308;0	300;0	268;0	187;0	100;0
Timber Harvest (acres)										
Clearcut	44,838	43,266	42,406	41,273	40,431	36,310	38,054	33,808	22,518	16,433
Mortality Salvage	1,273	1,287	1,166	1,065	1,046	5,338	793	825	200	74
Commercial Thinning	13,429	13,429	12,926	12,877	13,084	46,800	13,631	13,631	13,435	4,022
Site Preparation (acres)										
Broadcast Burning (slash disposal)	34,077	32,882	32,229	31,368	30,728	27,596	28,921	25,694	17,114	12,489
Herbicide	8,295	8,004	7,845	7,650	7,480	6,717	7,040	0	4,166	3,040
Manual	3,991	3,851	3,774	3,675	3,598	3,232	3,387	3,009	2,004	1,463
Mechanical	3,497	3,375	3,308	3,210	3,154	2,832	2,968	2,637	1,756	1,282
Planting (acres)										
Initial plant [4]	42,731	41,159	40,375	39,258	38,510	34,308	36,023	31,777	20,415	14,807
Replant or Interplant	10,683	10,290	10,094	9,815	9,628	8,577	9,006	7,944	5,104	3,702
Plantation Protection (acres)	14,242	13,718	13,457	13,085	12,835	11,435	12,006	10,591	6,804	4,935
Plantation Maintenance and Release (acres) [5]	40,892	39,459	38,674	37,630	36,873	33,115	34,705	5,770	20,536	14,987
Precommercial Thinning (acres)	14,073	14,073	13,571	13,998	14,011	18,800	13,998	13,998	8,013	5,676
Fertilization (acres)	70,156	70,156	67,700	67,136	67,686	99,343	65,595	65,595	45,243	25,415

[1] See Glossary. Also refer to Land Use Allocation, Appendix C, Table C-2.
[2] Each treatment is described in detail following description of the alternatives.
[3] Figured at the rate of 6 acres/mile of road including landings.
[4] Under all alternatives except 10, an estimated 15,500 acres would be planted with genetically improved stock.
[5] An estimated 10 percent of the acreages shown would be treated using methods other than chemicals. Under Alternative 8 no chemicals would be used.

Alternative 2 - Maximum Timber Production

This alternative consists of the same land use allocations and protective measures for resource values as Alternative 1. The only difference is that departure from even flow would not occur. Thus, the annual timber sale program would be 241 MM bd.ft. for the first and future decades.

Alternative 3 - Deferred Harvest

Allocation of 276,331 acres of commercial forest land to intensive timber management would occur under this alternative (see Appendix C, Table C-2). An additional 360 acres of highly sensitive scenic areas would be managed under extended rotation (MHA-120 years). Although included in the intensive timber base, 18,886 acres of old growth (distributed in a manner comparable to the constrained timberbase of the Original Proposed Action Alternative 7) would not be harvested during the 10-year planning period. This would provide for some old growth retention until advanced research on old growth ecology is completed. The annual timber sale program would be 234 MM bd.ft. for the proposed period. This level would be sustainable for the projection period (400 years, see Appendix C) if the old growth were harvested during the second decade. However, if the old growth were to be placed under extended rotation at the end of the first decade, the sustainable annual timber sale program would be 194 MM bd.ft.

Alternative 4 - Seral Stage Distribution (BLM's Preferred Alternative)

This alternative seeks a high level of timber production while preserving essential representative and functioning blocks of older seral stages (Appendix B). Large blocks would be 300-500 acres in size of which at least 50 percent would be old-growth seral stages (196 years plus) and the remainder in the mature seral stage (116-195 years). Based on a design to cover all BLM-administered land in western Oregon, one large block would be within each seed zone (see Appendix B) at 500-foot elevational intervals where sufficient old growth exists. Corridors consisting of 50- to 100-acre small blocks containing mature and old-growth timber (primarily old growth) and spaced at 1 to 1-1/2 mile intervals would be established between large blocks where possible.

In the Eugene SYUs, seven large blocks and 20 small blocks constituting 3,987 acres of mature and old-growth timber would be withdrawn from the timber production base (Appendix C, Tables C-2 and C-3). An additional 10,071 acres of commercial timber land would be withdrawn to protect riparian zones (along third order and larger streams), bald eagles, Research Natural Areas and sensitive botanical species. Three hundred sixty acres of highly sensitive scenic areas would be managed under extended rotation (MHA-120 years).

Protection for other wildlife considerations (elk and deer thermal/survival cover, snag retention and protection for the northern spotted owl) would be provided when consistent with intensive timber production. The annual timber sale program would be 230 MM bd. ft. for the 10-year period (Table 1-1).

Alternative 5 - East-West Corridor

An east-west linkage between National Forests in the Coast and Cascade Ranges and the proposed systems of wildlife habitat corridors presented in the South Coast-Curry Final and Roseburg Draft EISs, would be provided. This corridor would establish a regional system of habitat diversity for the northern spotted owl and other wildlife. This alternative was designed to provide a variety of seral stages which would be distributed to prevent isolation of specialized habitats and preserve opportunities for genetic interchange. Approximately 11,000 acres (Appendix C, Table C-2) would be managed on an extended rotation of 350 years producing an annual timber sale program of 223 MM bd.ft.

Riparian zones along third order and larger streams, bald eagles and Research Natural Areas would be protected (Appendix C, Tables C-2 and C-3).

Alternative 6 - No Action

Alternative 6 constitutes a continuation of the present allowable cut of 219 MM bd.ft. from 294,695 acres allocated to timber production. Continuation of the same management practices, level of application and constraints used in the 1972 allowable cut calculation is assumed. Management trends (such as reduced tractor yarding) established over the past decade would be continued. Minimal protection would be provided for some highly scenic areas, recreational sites and wildlife habitat. Non-timber allocations limited to 1,279 acres, include buffers for recreation areas, sensitive visual corridors and streamside corridors. Other land use allocations (Appendix C, Table C-2) and management objectives (Table 1-1) proposed under this alternative are those incorporated in the 1972 Eugene Timber Management Plan for its second decade of application.

Alternative 7 - The Original Proposed Action

The Original Proposed Action seeks a high level of timber production while managing for a variety of natural values and recreational opportunities. Approximately 9,500 acres of commercial forest land would be withdrawn to protect riparian zones, bald eagles and Research Natural Areas. Approximately 24,000 acres would be managed under extended rotation (Appendix C, Table C-2) for visual, wildlife and old-growth ecological values. Other management practices (Table 1-1) would include measures to mitigate impacts to wildlife habitat on early seral stages. The annual timber sale program would be 213 MM bd.ft.

Alternative 8 - No Use of Herbicides or Credit for Fertilization and Genetics

This alternative differs from Alternative 7 in that the forest management treatment of applying herbicides would not be incorporated. Control of vegetation for timber management by using biological, mechanical or manual means would be prescribed to approximately the same dollar level of investment as would be used for herbicide applications in Alternative 7.

Although this alternative would incorporate the practices of fertilizer application and the planting of genetically improved stock, no credit would be taken for expected growth increases. This would produce an average annual timber sale program of 190 MM bd.ft. (Table 1-1). Other management practices and constraints (Appendix C, Tables C-2 and C-3) would be the same as the Original Proposed Action.

Alternative 9 - Ecosystem

Under this alternative, emphasis would be placed on protecting and enhancing natural values over timber production. Protection would be provided for riparian zones adjacent to all streams (Appendix C, Table C-3) by withdrawal from the timber production base. Approximately 114,500 acres would be managed under extended rotation for visual, wildlife and old-growth ecological values (Table C-2). A wide variety of recreational opportunities, including an allocation for semi-primitive recreation in the Windy Peak Area, would be provided. The average annual timber sale program would be 133 MM bd.ft.

Alternative 10 - Maximum Ecosystem with Withdrawal of Old Growth

Maximum protection and enhancement of wildlife habitat, water quality, visual resources and other natural values would be provided. Approximately 146,000 acres would be managed primarily for wildlife habitat values, either through withdrawal from timber harvest or management under extended rotation (Appendix C, Tables C-2 and C-3). Riparian zones adjacent to all streams and all visual values would be protected. Recreational opportunities would be provided as described in Alternative 9. The average annual timber sale program would be 71 MM bd.ft. (Table 1-1).

FOREST MANAGEMENT TREATMENTS AND DESIGN ELEMENTS

Table 1-1 displays, in typical sequence, the types and levels of treatments for each alternative including the proposed action. Following harvest by clearcut or single tree selection, forest management treatments are applied to achieve prompt reforestation and to increase subsequent growth of commercial coniferous species.

Not every treatment listed in Table 1-1 would be applied to every acre. A number of treatment combinations are possible and could be employed. The purpose of this section is to elaborate on what each treatment entails and quantify the magnitude of the actions. Treatments would be identified and scheduled through application of the recently adopted forest data system (Solutions to Operations and Reforestation Monitoring Systems-STORMS 1981). For those actions accomplished by timber sale contracts, the final determination of treatment needs would be made during timber sale planning.

Contracts, usually awarded on a competitive basis, are the means of accomplishing all timber harvest and many forest development practices. The standard and special provisions (which include mitigating measures) in a contract set forth the performance standards to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations and policies. In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken and the physical characteristics of the specific site. The standard provisions of the basic timber sale contract, Bureau Form 5450-3, are applicable for all timber sales. Limitations on timber harvesting and related activities, as identified in the

Church Report (U.S. Congress, Senate 1973) and analyzed in the BLM Timber Management Final EIS-1975, have been adopted by BLM. Bureau manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. The combination of selected special provisions constitutes Section 41 of the timber sale contract (Form 5450-3).

Prior to any vegetative or ground manipulation, BLM requires a survey of the project site for plants and animals listed or proposed for listing as threatened and endangered species. If a project might affect any listed or proposed federal threatened or endangered species or its critical habitat, every effort would be made to modify, relocate or abandon the project in order to obtain a no effect determination. If BLM determines that a project cannot be altered or abandoned, consultation with the U.S. Fish and Wildlife Service would be initiated (50 CFR 402; Endangered Species Act of 1973, as amended).

Whenever evidence of historic or prehistoric occupation is identified during BLM activities, special surveys are undertaken to determine possible conflicts in management objectives. In addition, a Class III (complete) cultural resources inventory is required on all areas to be subjected to ground disturbing activities. This is accomplished in the pre-planning stage of a treatment and the results analyzed in the environmental assessment addressing the action (BLM Manual 8100, Cultural Resources Management). Should a cultural resource be discovered during timber harvest or associated activities, operations in proximity are immediately suspended and may only resume upon receipt of written instructions from the authorized BLM officer. Procedures under 36 CFR 800 as amended would then be followed including consultation with the State Historic Preservation Officer in the determinations of eligibility, effect and adverse effects.

Transportation System

Oregon Manual Supplement, Release 5-115 of April 10, 1975, would be used in preparing road construction requirements for timber sale contracts. Engineering terminology and types of construction equipment are defined in the manual supplement and specifications for all aspects of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided to avoid collapse of cut-and-fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

Special stipulations are provided for the installation of stream crossing structures, such as corrugated metal culverts, so that fish passage is not impeded. These measures may include imposing gradient limitations for the structures and/or installing baffles to reduce water velocity through the culverts.

One section of the manual supplement provides design features to control and minimize erosion during road construction and throughout the design life of the road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilizing for establishment of soil-binding vegetation.

Road reconstruction is proposed for all alternatives. The miles of road to be reconstructed range from 100 miles under Alternative 10 to 351 miles under Alternative 1. Similarly, the miles of new, permanent road to be constructed during the decade would range from 271 miles under Alternative 10 to 351 miles under Alternative 1 (Table 1-1). Construction standards, i.e., stream crossing, subgrade width, ditch, cut-and-fill slope requirements, and type of surfacing would be determined during the annual timber sale planning process. Basic construction operations as well as a brief history of transportation systems are described in detail in the programmatic environmental impact statement BLM prepared on timber management in the western United States (USDI, BLM 1975), hereafter referred to as the BLM Timber Management FEIS.

Timber Harvest

The primary timber harvest method to be employed during the next 10-year period would be clearcutting. An estimated 44 percent of the proposed final harvest by clearcutting (see Table 1-1 for proposed acreages by alternatives) would be accomplished by high lead cable yarding systems. Another 53 percent would be accomplished by cable yarding systems specifically providing partial log suspension and 1 percent by providing full log suspension. The remaining 2 percent would be harvested by tractor skidding. This variety of logging systems is a design feature employed primarily for watershed protection and reduced soil damage. Refer to the BLM Timber Management FEIS for a detailed description of logging systems.

Single tree selection would be employed for harvest of dead and dying timber (mortality salvage) in stands not scheduled for harvest within the 10-year period. Mortality salvage would take place on lands in the intensive timber production base and on all other lands in the event of a major catastrophic event or when beneficial to wildlife or fish. The variance in acreages proposed for mortality salvage (Table 1-1) reflects the differences in over-mature timber available under each alternative.

Commercial thinning (see Glossary) would be applied to intensively managed timber stands between the ages of 30 and 70 years. The interval of treatment (ranging from 10 to 30 years) would vary according to site characterization with poor sites having longer intervals. Acreages of commercial thinning by alternative are presented in Table 1-1.

Site Preparation

Site preparation procedures are used to prepare newly harvested and inadequately stocked areas for the planting of a new crop of trees. Four types of site preparation treatments (broadcast burning, herbicides, mechanical and manual) would be utilized (see Table 1-1).

Broadcast burning is the primary method of site preparation proposed under each alternative. Some variables (Wright and Bailey 1982) that associate slash burning with regeneration include the type and amount of slash, remaining vegetation and air quality limitation. Burning would occur at times approved by the Oregon State Department of Forestry which administers the Smoke Management portion of the State's Air Quality Implementation Plan. Acreage, including those receiving slash disposal by broadcast burning (Table 1-1), may receive one or more of the following site preparation treatments.

Site preparation treatment using herbicides (Table 1-2) is included in all alternatives except Alternative 8. Herbicides are used to increase plantation survival rate by control of grasses, forbs, brush and non-commercial tree species. These treatments improve the potential for success by reducing competition for light, moisture and soil nutrients during the tree seedling establishment period. Application and monitoring of herbicides would be in accordance with BLM's FEIS Vegetation Management with Herbicides: Western Oregon 1978 through 1987. See the following Plantation Maintenance and Release section for more detail.

Table 1-2 Estimated Ten-Year Use of Herbicides

						Estimated Acres								
Chemical	Method	Season	Carrier	Target Species	Application Rate[1] (lbs./acre)	Alt.1 Max/EFD	Alt.2 Max.Tbr.	Alt.3 Def.Har.	Alt. 4 S.S.D.	Alt.5 E-W Cor.	Alt.6 No Action	Alt.7 O.P.A.*	Alt.9 Eco.	Alt.10 Full Eco.
SITE PREPARATION														
Atrazine-Dalapon	Aerial& ground	Spring	Water	Annual & perennial grasses	4 lbs. ea.	3,293	3,178	3,114	3,037	2,970	2,667	2,795	1,654	1,207
2,4-D	Aerial	Spring	Water & oil	Ceanothus, red alder	3 lbs.	489	472	463	450	441	396	415	246	179
Garlon	Aerial& ground	Spring-Fall	Water & oil	Vine maple, red alder, ceanothus, big leaf maple	1-3 lbs.	1,385	1,337	1,310	1,279	1,249	1,122	1,176	696	508
Roundup	Aerial& ground	Spring-Fall	Water	Grasses, vine maple, salmonberry	1-3 lbs.	1,999	1,929	1,891	1,845	1,803	1,619	1,697	1,004	733
Tordon	Ground	Year-round	None	Red alder, big leaf maple	0.5 lbs. 324	312	306	300	292	262	275	162	119	
Krenite	Aerial	Fall	Water	Vine maple, hazel	3-4 lbs.	108	104	102	100	97	87	91	54	39
Asulox	Aerial	Fall	Water	Bracken fern	1.5 lbs.	697	672	659	639	628	564	591	350	255
Plantation Maintenance & Release														
Atrazine-Dalapon	Aerial& ground	Spring	Water	Annual & perennial grasses	4 lbs ea.	946	913	895	860	853	766	803	475	347
2,4-D	Ground	Spring	Water	Ceanothus, red alder	2 lbs.	8,480	8,183	8,020	7,790	7,646	6,867	7,197	4,259	3,108
Garlon	Aerial& ground	Spring-Fall	Water & oil	Vine maple, red alder ceanothus, big leaf maple, hazel	1.5 lbs.	12,920	12,467	12,219	11,880	11,650	10,463	10,965	6,488	4,735
Roundup	Aerial& ground	Spring-Fall	Water & oil	Grasses, vine maple, salmonberry, hazel	1.5 lbs.	13,029	12,573	12,322	12,000	11,749	10,551	11,057	6,543	4,775
Tordon	Ground	Year-round	None	Red alder, big leaf maple	0.5 lbs.	582	562	551	540	525	472	494	292	213
Krenite	Aerial	Fall	Water	Vine maple, hazel	3 lbs.	109	105	103	100	99	88	93	55	40
Asulox	Aerial	Fall	Water	Bracken fern	1.5 lbs.	328	316	310	320	295	265	278	165	120

[1] Active ingredients (in total pounds) applied may be figured by multiplying the application rate by the estimated acres under each alternative.

* Alternative 8 does not employ the use of herbicides.

Manual site preparation consisting of brush pulling or cutting or hand piling of slash for burning would occur on some acreage during the next decade (Table 1-1).

Mechanical site preparation would consist of scarification and piling or windrowing of slash, brush and unmerchantable stems. Bulldozers equipped with a brush blade would normally be used. However, using this type of equipment would be restricted to areas with suitable soil types, slopes less than 35 percent, and accomplished during periods of low soil moisture. Small cable yard equipment could be used on slopes greater than 35 percent.

Planting

To achieve adequate reforestation within 5 years following harvest on timber production lands, harvested areas would be planted with commercial coniferous species (Douglas-fir, western hemlock and western red cedar) within approximately 1 year of the completion of harvesting. Planting stock is nursery grown from seed collected on sites and at elevations similar to the specific project area. Genetically improved stock is also being nursery grown and would be scheduled for planting on 15,514 acres under all alternatives except Alternative 10. The broad selection of parent trees for genetically improved stock is intended to maintain genetic diversity (BLM Instruction Memorandum OR 79-334).

Reforestation experience in the SYUs shows that target stocking levels of 245 to 320 well-spaced trees per acre depending on site class cannot always be achieved by the initial planting. Post-treatment surveys would be conducted to determine the rate of survival and when replanting or interplanting would be required to meet stocking standards.

Plantation Protection

Estimated acreages that would require some type of protective treatment are shown in Table 1-1. Treatments would include protection from the sun by shading and protection from damage by deer, elk, mountain beaver or other small animals by placing plastic tubing or netting over seedlings or by bud capping. Mountain beaver would be trapped when they occur in significant numbers in a plantation. The number of acres requiring each of these treatments would be determined annually in conjunction with normal reforestation surveys.

Plantation Maintenance and Release

Maintenance treatments promote the survival and establishment of coniferous seedlings. Release treatments reduce competition for light, moisture and nutrients between shrubs or grass and existing commercial coniferous seedlings and promote dominance and growth of established coniferous trees.

Fast-growing hardwoods, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies with the individual site. On dry sites, grasses, forbs and shrubs are strong competitors for water, while elsewhere hardwoods grow rapidly enough to shut out essential light and compete for water during the dry summer. With reduced competition, the conifers rapidly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved (approximately 3 to 10 years from planting), there would be no further control of competing vegetation necessary.

In recent years, herbicides have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients and light for suppressed conifers. Herbicides are applied aerially or by several ground methods. The method selected is dependent on costs, topography, limits of the equipment, kind and dispersion of target plants, potential environmental impacts and biological conditions. Most of the herbicides proposed for use in the Eugene SYUs would be applied by helicopters equipped with systems designed to limit herbicide application to the target areas. Helicopter application would be accomplished under contract through the competitive bidding process.

Timing of herbicide treatment is stringently controlled in relation to specified weather conditions such as temperature, humidity and wind. There is full authority for ordering cessation of operations based on adverse field conditions. Both equipment and operators are frequently checked by field project supervisors. Only registered chemicals would be used and in accordance with labeled instructions on the container. Handling, storage and application of chemicals would be in accordance with the Oregon Forest Practices Rules (See the Interrelationships section, State and Local Government).

Continuous administration of spraying contracts in progress is required. Water samples of some adjacent streams are taken prior to spraying, to establish baseline quality, and at specified intervals thereafter.

The use of herbicides for maintenance and release is included in all alternatives except for Alternative 8. Table 1-2 shows the chemicals, target species and estimated acreage of herbicide use as proposed during the 10-year period. Alternative 8, which does not incorporate herbicide use, employs manual methods for release of 5,770 acres. All other alternatives would employ manual methods on approximately 11 percent of the acres treated during the proposal period (see Table 1-1). Manual methods would consist of clearing around selected commercial tree species using hand tools.

Each area proposed for maintenance or release treatment would undergo a site specific environmental assessment. During this analysis, alternative methods of vegetation control are considered including chemical, manual and mechanical means. Assessments addressing specific herbicide projects are prepared and tiered under BLM's FEIS Vegetation Management with Herbicides: Western Oregon - 1978 through 1987. Protective stream buffers (determined according to stream classification and herbicide used) and monitoring of herbicide application are as described in the FEIS mentioned above.

Precommercial Thinning

Precommercial thinning would be applied to timber stands between 10 and 15 years of age that contain over 500 stems per acre. This treatment concentrates available nutrients, moisture and light into those trees which would be the eventual crop for future harvest.

The number of trees cut per acre during pre-commercial thinning is dependent on the density of the stand before thinning. While average spacing of crop trees would be approximately 12 feet, the number left may vary between 245 and 320 per acre. Contract specifications, emphasized by field instructions to crews, cover desired spacing of crop trees and criteria for crop tree selection.

Fertilization

Areas precommercially and commercially thinned and portions of areas where stocking control is achieved through plantation spacing would be fertilized where effective (Table 1-1). Continuing studies and analysis will be conducted to determine fertilizer response and economic effectiveness of planned projects. The average application is expected to be 200 pounds of nitrogen per acre beginning when the stand is precommercially thinned and at 10-year intervals thereafter until 10 years before final harvest. In addition to acceleration of growth for up to 7 years following treatment, fertilization tends to reduce shock associated with thinning.

COMPARISON OF IMPACTS

This section compares in tabular form (Table 1-3) the impacts of each alternative including the preferred alternative (Alternative 4) and the Original Proposed Action (Alternative 7). While impacts have been described in detail in Chapter 3, Table 1-3 is presented to assist decisionmakers and reviewers by summarizing the impacts of each alternative.

IMPLEMENTATION

Final Decision

After release of the final EIS (and following the comment period) the District Manager will review the public comments on both draft and final EISs and prepare a Record of Decision. The recommended decision may be to select one of the EIS alternatives intact, or to blend features from the alternatives analyzed in the FEIS. Significant conflicts, alternatives, environmental preferences, economic, technical and policy considerations will be addressed in the Record of Decision, which is expected in 1983. The final decision will be made by the State Director.

Monitoring and Studies

BLM land management programs are monitored in various ways. Currently, forest management practices are monitored primarily through administration of contracts under which most actions are authorized. Timber sale contracts are inspected at least once a week, when active, and more often if sensitive operations are in progress. Daily administrative visits are not uncommon when harvest is moving at a fast pace, slash disposal is occurring, or road construction involving critical aspects (such as stream crossing structures) is taking place. Service contracts, i.e., tree planting, precommercial thinning, tubing, manual brush cutting and fertilization, are monitored at regular intervals to determine the quality and quantity of completed work. Visits to these operations range from twice a week to the full-time presence of a Bureau contract administrator, depending on the experience of the contractor and

Table 1-3 Summary of Impacts

Environmental Components Impacted	Units of Measure	Existing Situation	Alt. 1 Max/EFD	Alt. 2 Max. Tbr.	Alt.3 Det.Har.	Alt. 4 S.S.D.	Alt.5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt.8 No Herb.	Alt.9 Eco.	Alt. 10 Full Eco.	Remarks
Air Quality													
Nitrous oxides	tons/year	N/A	239	230	226	220	215	193	202	180	120	87	
Hydrocarbons	tons/year	N/A	1,491	1,439	1,410	1,372	1,344	1,207	1,265	1,124	749	546	
Particulates	tons/year	N/A	2,505	2,417	2,367	2,306	2,259	2,028	2,126	1,889	1,258	918	
Soils													
Lost productivity	acres/decade	N/A	4,471	4,388	4,267	4,251	4,056	4,021	4,043	3,824	3,311	2,491	
Water Resources													
Sediment yield	tons x 100/ decade	N/A	910	891	712	698	676	788	668	625	251	189	
Vegetation													
Acres denuded by Road construction	acres/decade	2,274	2,107	2,107	2,031	2,015	1,921	2,002	2,031	2,031	2,103	1,626	
Plant habitat altered by													
Timber harvesting	acres/decade		57,433	55,875	54,467	53,200	52,640	86,446	50,447	46,233	34,050	18,903	
Herbicide use	acres/decade		44,689	43,123	42,265	41,140	40,297	36,189	37,927	0	22,443	16,378	
Wildlife Habitat													
Habitat modified	acres/decade	N/A	75,700	74,200	72,100	71,200	70,500	109,300	68,500	64,300	46,300	27,800	Roads, harvest and thinning.
Early successional stage habitat, end 1st decade [1]	acres	64,400	77,000	75,400	74,600	73,500	72,800	70,400	70,300	66,000	54,900	49,100	Habitat < 15 years old.
	quality	M	L	L	L	L	L	L	M	M	H	H	
Early successional stage habitat, end 10th decade	acres	64,400	53,700	51,200	53,075	49,700	47,400	70,800	33,752	89,900	21,200	10,900	Habitat < 15 years old.
	quality	M	L	L	L	L	L	L	M	M	H	H	
Old growth habitat, end 1st decade [1]	acres	48,400	25,500	26,300	26,800	27,400	27,700	0	28,900	30,900	35,600	48,400	Habitat 196 years and older.
	quality	M	L	L	L	L	L	N/A	M	M	H	H	
Old growth habitat, end 10th decade	acres	48,400	8,900	8,900	12,100	16,400	16,500	0	22,300	22,300	46,200	57,000	Habitat 196 years and older.
	quality	M	L	L	L	L	L	N/A	M	M	H	H	
Wildlife Population													
Roosevelt Elk, end of 2nd decade	Percent change from existing	N/A	-40%	-40%	-40%	-35%	-30%	-45%	-20%	-15%	+ 5%	+10%	Plus or minus 5 percent.
Roosevelt Elk, end of 10th decade	Percent change from existing	N/A	-60%	-60%	-60%	-60%	-45%	-75%	-40%	-25%	0	+10%	Plus or minus 5 percent.
N. Spotted Owl, end of 10th decade	Pairs	42	0	0	0	1	12	0	19	19	41	54	300 acre old growth management recommendation.
N. Spotted Owl, end of 10th decade	Pairs	42	0	0	0	1	8	0	12	12	27	41	1,000 acre old growth management recommendation.
Coldwater fish population 1st decade	Percent change from existing	N/A	-10%	-10%	+10%	+10%	+10%	+10%	+10%	+10%	+20%	+20%	
Coldwater fish population 10th decade	Percent change from existing	N/A	-30%	-30%	-30%	+25%	+25%	+10%	+25%	+25%	+50%	+50%	
Recreation	Ability to meet needs	–	-	-	+	+	-	-	+	+	+	+	
Cultural Resources	Inadvertent degradation (undiscovered sites)	–	-L	-L	-L	-L	-L	-L	-L	-L	-L	-L	Based on comparison of harvest levels.
Visual Resources	Degradation of scenic quality	–	-H	-H	-M	-M	-M	-H	-M	-M	+L	+L	
Areas of Critical Enviromental Concern	Degradation of resource values	–	-L	-L	0	0	0	-L	0	0	0	0	
Special Areas	Site degradation	–	-L	-L	0	0	-0	-L	0	0	0	0	
Socioeconomic [2]													
Impacts Compared to Existing Condition													
Total earnings	$ millions	74.5	+24.6	+21.4	+18.6	+17.0	+14.2	+12.6	+10.2	+1.1	-21.6	-46.3	
Total employment	jobs	4,120	+1,357	+1,181	+1,027	+952	+785	+697	+565	+59	-1,195	-2,259	
Public Revenue	$ millions	22.7	+7.5	+6.5	+5.7	+5.2	+4.3	+3.8	+3.1	+.3	-6.6	-14.1	
Impacts Compared to No Action Condition [3]													
Total earnings	$ millions	87.2	+11.9	+8.8	+6.0	+4.4	+1.6	+0	-2.4	-11.5	-34.2	-58.9	
Total Employment	jobs	4,818	+880	+484	+330	+242	+88	+0	-132	-638	-1,892	-3,256	
Public Revenue	$ millions	26.5	+3.6	+2.7	+1.8	+1.3	+.5	+0	-.7	-3.5	-10.4	-17.9	

[1] Refer to Chapter 3, Tables 3-7A & B

[2] See Chapter 3 for discussion of dual impact measures.

[3] Impacts measured from No Action Condition (Alternative 6).

+ Beneficial - Negative L Low M Medium H High

rate of progress. Daily visits usually occur when there is reason to believe that the operator will require help in the interpretation of contract requirements.

Silvicultural treatment success is monitored through a series of inventories and surveys performed at various times during the stand's life. Appropriate stocking surveys are performed both prior to and after a treatment is accomplished. Information from these surveys identifies the need for or success of a particular silvicultural treatment. This information is documented and maintained in the operations and reforestation records systems. In addition, plans are in progress to measure actual growth responses from thinning programs in the SYUs.

Water quality monitoring would be carried out in accordance with Executive Orders 11514 (partially amended by 11991) and 12088, Sections 208 and 313 of the Clean Water Act (PL 95-217, PL 92-500 as amended), BLM Manual 7240 and Oregon Department of Environmental Quality Memorandum of Understanding (MOU-OR 158). Standard analytical methods would be followed.

Monitoring for other resource management programs (wildlife habitat, visual, cultural and recreational) would be outlined in the Record of Decision.

Requirements for Further Environmental Assessment

This environmental impact statement may best be described as a regional programmatic statement for the proposed 10-year timber management plan and is considered applicable for the decade. A series of environmental assessments (EAs) will be prepared on detailed site specific plans for each type of treatment under consideration for each year. Interdisciplinary impact assessment will be tiered within the framework of this and other applicable environmental impact statements.

An environmental assessment of a timber sale (or group of sales) will address the effects of the harvest method, yarding system, road construction or reconstruction, slash disposal and any other treatments conducted under the terms of a timber sale contract. EAs will also be prepared on forest development projects such as precommercial thinning, animal damage control, fertilization and herbicide applications. It is expected that environmental assessments will either identify modest impacts or lead to mitigation resulting in modest net impacts. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the environmental assessment is a primary means for determining appropriate contract stipulations. Projects to be accomplished by BLM personnel are conducted in accordance with the findings of the assessment and decision documents.

If an environmental assessment indicates potential for significant impacts not already described in an existing EIS, an environmental impact statement or a supplement to an existing EIS may be required.

INTERRELATIONSHIPS

Much of northwest Oregon is timber-producing land. In addition to the BLM, jurisdictions include the U.S. Forest Service, State of Oregon, the counties, and private companies and individuals. Each entity approaches management of timber lands differently, although some periodically prepare internal or public plans for their management.

Federal Agencies

The Eugene SYUs share in part a common boundary with the Siuslaw and Willamette National Forests. Coordination between the BLM District Manager and the Forest Supervisors is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road construction, use and fire protection.

The U.S. Army Corps of Engineers has the authority, under Section 404 of the Clean Water Act of 1977 (P.L. 95-217), to regulate the discharge of dredged or fill materials into any estuary, wetland or streams of the United States with flow in excess of 5 cubic feet per second. Normal silvicultural practices are exempt from this regulation. Based on the adequacy of BLM environmental protection practices, the Corps has issued BLM a general permit for all such activities. Under the permit, BLM provides the Corps, the State Division of Lands and certain environmental review agencies with advance notice of specific proposed projects. Larger projects exceeding limits in the general permit require a separate permit.

The U.S. Fish and Wildlife Service administers the Endangered Species Act of 1973 (as amended). Accordingly, BLM consults with that agency when it is determined that a threatened or endangered species or its critical habitat may be affected. The purpose of consultation is to obtain a formal biological opinion on the appropriate course of action. The outcome of such consultation may mean modification or abandonment of the action.

The National Marine Fisheries Service (NMFS) is responsible for oversight and evaluation of activities which may affect marine, estuarine, and anadromous

fishery resources. NMFS participates in comprehensive land and water use planning under the terms of the Water Resources Planning Act, the Coastal Zone Management Act, and the National Environmental Policy Act and makes recommendations for maintenance or enchancement of anadromous fishery resources under the terms of the Fish and Wildlife Coordination Act.

The National Park Service (NPS) administers the Nationwide Rivers Inventory, as provided under the National Wild and Scenic Rivers Act of 1968. Present efforts are directed toward inventory and evaluation to determine which free-flowing rivers and river segments are suitable for possible designation as components of the National Wild and Scenic Rivers System. BLM consultation with NPS is required if proposed management actions could alter a river's ability to meet established Wild and Scenic Rivers Act eligibility and/or classification criteria.

State and Local Governments

Section 202(c) of the Federal Land Policy and Management Act requires BLM to coordinate its planning efforts with those of State and local governments; assist in resolving inconsistencies in our mutual planning efforts; provide for State and local governmental involvement in development of BLM land use programs, regulations and land use decisions; and develop BLM resource management plans and programs consistent with those of State and local government to the extent that such BLM plans and programs are also consistent with Federal law and regulations. BLM coordination efforts involve a number of State and local administrative and planning agencies as highlighted below.

The Intergovernmental Relations Division for the State of Oregon is the clearinghouse for the various State agencies. Notice of all BLM planning and major proposed actions are provided for coordinated State level review by the State Clearinghouse. The Regional Councils of Government serve as the clearinghouse for coordinated review of proposed BLM activities by county and local governments in their respective areas of interest. BLM involvement with the four counties in the SYUs is largely via the several boards of county commissioners. Through these bodies, county governments participate in planning for land use, road construction and recreational developments on public lands administered by BLM.

The Oregon Land Conservation and Development Commission (LCDC) administers the State comprehensive land use planning program as provided in Oregon State Statutes, (ORS 197). In this program, county and local governments are required to develop comprehensive land use plans and implementing ordinances consistent with 14 statewide planning goals and guidelines. These call for a balance between conservation and development to best meet public needs.

LCDC is the primary State agency responsible for implementing the Oregon Coastal Management Program established under P.L. 94-370, the Coastal Zone Management Act (CZMA) of 1972, as amended (16 U.S.C. 1451 et seq.). This program relies initially on county and local comprehensive planning under ORS 197 with special emphasis on unique characteristics of coastal resources. In addition to the 14 statewide goals for planning consideration, coastal planning is guided by four special State Coastal Goals and Guides: Estuarine Resources, Coastal Shorelands, Beaches, and Dunes and Ocean Resources.

CZMA requires Federal activities to be consistent to the maximum extent practicable with the Oregon Coastal program. Although Federal lands are specifically excluded from the coastal zone, such BLM activities as would directly affect coastal resources outside the BLM lands require BLM consistency statements. These statements are made through the A-95 Clearinghouse notification and review process. All alternatives are expected to be consistent with the CZMA.

Close relations have been established with LCDC to ensure cooperation and coordination of BLM programs and planning efforts with those conducted by county and local governments under ORS 197 and CZMA. The relationship of the Eugene alternatives to the LCDC Statewide and Coastal Goals is shown on Table 1-4. Discussion comments on this table generally focus attention on deficiencies in addressing the listed goals.

Throughout the planning process, BLM has worked with Lane County to achieve consistency with local plans. Methods of involving local governments have included: (1) frequent informal contacts to discuss local planning concerns; (2) invitations to participate in public tours, workshops and meetings; and (3) discussions with the Lane County planning department to determine consistency of BLM's preferred land use plan with acknowledged local plans.

The Comprehensive Land Use Plan for Lane County was adopted by the Lane County Board of Commissioners in 1980 and is awaiting acknowledgement (acceptance) by LCDC. To meet the decision factor regarding consistency with State and local land use plans, the preferred alternative was developed to be consistent with the recently adopted Comprehensive Land Use Plan of Lane County. The status of adjacent county plans involving lands in the SYUs as of July 26, 1982 is shown below:

County	Adopted (By Board of Commissioners)	(Accepted by LCDC)
Linn	Yes	No
Benton	Yes	No
Douglas	Yes	No

Upon release of the draft EIS, appropriate counties will be asked to determine the consistency of timber management alternatives with adopted plans. County responses will be published in the final EIS.

The Oregon State Forester, by means of the Forest Practices Act of 1972, regulates timber harvest methods and supportive practices on all non-Federal lands within the SYUs. Minimum standards are prescribed relating to the following forest practices:

- Timber harvest.
- Reforestation of economically suitable lands.
- Road construction and maintenance on forest land.
- Chemical applications.
- Slash disposal.
- Maintenance of streamside buffers.

Although Federal agencies are not bound by State forest practice rules, Bureau minimum standards meet or exceed State rules. The BLM and USFS, acting jointly, have entered into a Memorandum of Understanding (MOU) with the State Forester in this regard.

BLM is a cooperator in the statewide Smoke Management Plan administered by the Oregon State Forester in order to comply with the Clean Air Act of 1963 (as amended). The primary objective of the plan is to keep smoke from slash disposal operations away from population centers. Slash burning is allowed to begin only when smoke dispersion conditions are determined by Oregon State Department of Forestry (OSDF) to be favorable.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the SYUs. That department undertakes presuppression and suppression actions for all lands in the area.

The Forestry Program for Oregon (Oregon State Board of Forestry 1977) outlines basic objectives of the Oregon State Board of Forestry for timber land management within the State. The relationship of the proposed action and alternatives to these basic objectives is shown in Table 1-5.

Management of wildlife, including fish, within the SYUs is the responsibility of the Oregon Department of Fish and Wildlife. BLM, in managing lands under its jurisdiction, considers wildlife habitat as a resource category. The Sikes Act (PL 93-452), as amended, is the primary tool guiding coordination between BLM and the Oregon Department of Fish and Wildlife. Cooperative agreements and memorandums of understanding describe the responsibilities of the two agencies.

The Oregon Department of Environmental Quality (ODEQ) has lead responsibility for statewide water quality management planning in accordance with Section 208 of P.L. 92-500 (Federal Water Pollution Control Act) as amended by P.L. 95-217 (Clean Water Act). BLM and ODEQ have entered into a Memorandum of Understanding (MOU) which outlines their respective roles in meeting State water quality objectives. The MOU assures close interagency cooperation, development and implementation of appropriate practices and control measures to comply with the Clean Water Act, and compliance with State requirements. BLM forest management practices meet or exceed objectives of the statewide water quality management plan.

Table 1-4 Relationship of Eugene EIS Alternatives to LCDC Statewide and Coastal Goals [1]

LCDC Statewide Goal Number and Description	LCDC Statewide Goal [2] Discussion
1. To insure citizen involvement in all phases of the planning process.	BLM land use planning process provides for public input at every stage--from assistance in the initial inventory to the identification of management opportunities, the development of alternatives, the environmental analysis and the final decision.
2. To establish a land use process and policy framework as a basis for all decisions and actions.	The proposed action and all alternatives have been developed in accordance with the land use planning process authorized by the Federal Land Policy and Management Act of 1976 which provides a policy framework for all decisions and actions.
4. To conserve forest lands for forest uses.	The planning area is predominantly forest land. The proposed action and alternatives all provide retention of inventoried forest lands for forest uses. While Alternatives 1 through 4 place emphasis on increased timber production, Alternatives 5 through 10 provides for multiple use. No alternative exceeds the productive capacity of the land base and all proposed uses are compatible with forest uses in this goal.
5. To conserve open space and protect natural and scenic resources.	All alternatives conserve open space. All alternatives except 1 and 2 protect scenic resources to some degree.
6. To maintain and improve the quality of the air, water and land resources.	Only Alternatives 1 and 2 do not fully address necessary enhancement of land and water quality for multiple use of forest lands or for meeting Federal and State minimum water quality standards. Slash burning will increase smoke (See Table 3-1). All alternatives would comply with the statewide smoke management plan.
7. To protect life and property from natural disasters and hazards.	All alternatives include identification of potential hazard areas and general BLM program and operational measures for protection of life and property from natural disasters and hazards.

[1] LCDC goals not generally applicable to the proposal and alternatives are: 3. Agricultural Lands; 10. Housing; 11. Public Facilities and Services; 14. Urbanization; 15. Willamette Greenway; 17. Coastal Shorelands; and 18. Beaches.

[2] See Chapter 3 and Table 1-3 for impacts of the alternatives on the various resources. Also see the Index and Table of Contents for specific page numbers to specific resources.

Table 1-4 Relationship of Eugene EIS Alternatives to LCDC Statewide and Coastal Goals [1]

LCDC Statewide Goal Number and Description	Discussion [2]
8. To satisfy the recreational needs of the citizens of the State and visitors.	Alternatives 1, 2, 5 and 6 would best meet demands for increasing motorized vehicle accessibility to the recreation base lands but would fail to adequately meet increasing demands for recreational activity opportunity areas. Alternatives 3, 4, 7, 8, 9 and 10 would provide opportunity areas to meet recreation needs. Under all alternatives, BLM would actively coordinate outdoor recreation efforts with other agencies.
9. To diversify and improve the economy of the State.	Alternatives 1 through 5 would increase timber production for greater economic returns, but diminish opportunities for diversity. Alternatives 7 through 10 provide diversity but would result in decreases in total economic returns.
12. To provide and encourage a safe, convenient and economic transportation system.	The forest transportation system will be expanded and improved.
13. To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities. Use of cull logs and slash for chips and firewood is encouraged.
LCDC Coastal Goal Number and Description	**Discussion**
16. To recognize and protect estuarine resources.	All alternatives recognize and protect estuarine resources. Alternative 1 would cause the greatest amount of sediment and Alternative 10 the least.
19. To conserve the long-term values, benefits and natural resources of the near shore ocean and Continental Shelf.	BLM programs for protection and enhancement of anadromous fisheries would relate to this goal. As discussed above for Goal 6, Alternatives 1 and 2 make the least provision for protection and enhancement of upstream fisheries habitat.

Table 1-5 Consistency of the Eugene Alternatives with Basic Objectives of the Forestry Program for Oregon [1]

Basic Objective	Proposed Action and Alternatives: Consistent	Minimally Consistent	Inconsistent	Discussion
To maintain the maximum commercial forest land base consistent with other resource uses while assuring environmental quality.	1,2,4,6	3	5,7,8,9,10	The benchmark (286,039 acres) for consistency is the commercial forest land base minus withdrawn TPCC lands. Environmental quality would be protected to the degree specified in the Oregon Forest Practices Act.
To maintain or increase the allowable annual harvest levels to its fullest potential to offset potential socioeconomic impacts.	1,2,3,4,5,6	7	8,9,10	The benchmark for consistency is the current allowable cut volume of 219 MM bd.ft. per year. The level of cutting the land base can sustain is dependent on number of acres allocated to timber production, level of management the land base receives and productivity of the land.
To identify and implement the levels of intensive forest management required to achieve maximum growth and harvest.	1,2,3,4,5,7	6	8,9,10	BLM currently implements a full range of intensive timber management practices for optimizing timber production. New and improved practices would be implemented consistent with technological advances.
To maintain community stability by remaining flexible for increases in future harvest levels that would offset projected shortages.		1	2,3,4,5,6, 7,8,9,10	The benchmark for consistency is the Eugene District cooperative harvest target of 273 MM bd.ft./Yr. [2] as determined by OSDF. Flexibility in harvest levels would be achieved by Alternative 1, which includes a deviation from even flow.

[1] Arrived at through consultation with Oregon State Department of Forestry (OSDF)
[2] Oregon State Forestry Department, 1980.

CHAPTER 2
AFFECTED ENVIRONMENT

This chapter addresses the environment as it exists today within the Eugene Sustained Yield Units (SYUs). In the SYUs there are approximately 317,000 acres of BLM-managed lands, of which 307,900 acres are forested. Timber harvest has been ongoing for several decades, and the environment described exhibits the effects of human use. Approximately 48,500 acres of 196 year-plus old growth timber remains on scattered tracts of public land.

Chapter 2 provides a basis on which impacts of all the alternatives may be assessed. Data and analysis will be commensurate with the importance of the impact, with less important material summarized, consolidated or simply referenced.

In preparation of this chapter, the primary data sources are documents of the Bureau planning system developed by the Eugene District. The Unit Resource Analysis (URA), Planning Area Analysis (PAA) and proposed Management Framework Plan (MFP) for the Eugene area are available for review at the Eugene District Office of BLM in Eugene, Oregon.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. A listing of these references appears in the References Cited.

CLIMATE AND AIR QUALITY

The area has a temperate marine climate with warm summers and mild, wet winters. In Eugene, the mean maximum temperature is 82°F, the mean minimum is 31°F. The record high was 108°F in 1981 and the record low was -12°F in 1972. Monthly precipitation, mostly as rain, ranges from a high of 20.99 inches in December 1964 to no rainfall during July and August (1933). Average precipitation is about 50 inches annually in the Eugene SYUs. The frost-free growing season averages about 160 days from May through October.

Air movement patterns are predominately from the north in summer and southerly during the late fall and early winter months. Occasionally during the winter months, strong southwesterly winds exceeding 50 miles per hour occur in the Eugene SYUs.

During the summer and fall months, the valleys and interior hills of the Eugene SYUs are subject to inversions--cool air stabilizing below warmer air above. When this condition exists, smoke from slash burning will not rise high enough to mix with upper air currents. Specific information on the extent and duration of these conditions within the area is given in Tables 2-1 and 2-2.

Table 2-1 Seasonal Variation of Air Pollution Potential in the Upper Willamette Valley*

Season	Stagnation Upper Layer	Lower Layer	Mixing Between Upper and Lower Air Layers	Air Pollution Potential
Spring	Absent	Present briefly at night	Present	Low
Early Summer	Absent	Present briefly at night	Present	Low
Summer	Present	Present, except in the afternoon; persisting several weeks at a time	Absent	High
Fall	Present	Present; often persisting for a week or more	Absent	Very high
Winter	Absent	Present for a day or two at a time; frequentinterruption	Generally present	Moderate

* Source: Crises Air, Central Lane Planning Council (now L-COG), 1968.

Table 2-2 Slash Smoke Problems in Lane County

Year	Number of Burns	Acres	Tons of Slash	Number of Problems Total	BLM	Days
1977	626	22,791	761,693	6	2	2
1978	980	30,197	1,084,947	7	2	1
1979	791	40,074	539,438	5	0	0
1980	927	27,086	829,633	13	5	2
1981	897	33,533	594,174	6	2	1

Source: ODEQ 1981; OSDF Annual Reports of Oregon Smoke Management Plans, 1977 through 1982.

Under the Clean Air Act Amendments of 1970, Oregon has been divided into five Federal Air Quality Control Regions (AQCRs) on the basis of pollution concentrations, geography and economics. The Eugene SYUs are in the Willamette Valley region. Air quality in this AQCR is good except in the Eugene-Springfield Area, which has been designated an Air Quality Maintenance Area (AQMA). The Eugene-Springfield AQMA contains sub-areas that are not in attainment with the secondary total suspended particulate standards and the 8-hour carbon monoxide standard (ODEQ 1981). Projected attainment dates are 1985 for carbon monoxide and 1987 for particulates.

Provisions of the Clean Air Act Amendments of 1977 ensure that areas with clean air do not suffer deteriorating air quality. Mandatory Class I areas, within an approximate 100 mile radius of the Eugene SYUs, are Kalmiopsis, Mt. Washington, Three Sisters, Mt. Jefferson, Mt. Hood and Diamond Peak Wilderness areas and Crater Lake National Park. The Eugene SYUs and surrounding areas (except Eugene-Springfield AQMA) are designated Class II which allows only moderate deterioration of air quality.

Occasionally, smoke from slash burning in the Eugene SYUs has been visible in the population centers of Roseburg and Eugene-Springfield (OSDF 1981). Slash smoke problems (visible smoke) in Lane County are shown in Table 2-2.
About 90 percent of the Eugene SYUs is in Lane County.

GEOLOGY AND TOPOGRAPHY

The Eugene SYUs are located within the Coast Range, Willamette Valley and Western Cascades physiographic provinces (Figure 2-1). The Coast Range is characterized by narrow ridges and steep slopes. The steepest slopes are found in the headwalls of tributary streams. Bedrock is primarily sedimentary in origin. Unstable slopes occur where the bedrock consists of weathered, thick-bedded sandstone and siltstone (Flourney Formation). The Willamette Valley is a broad alluvial plain situated between the Coast Range and the Western Cascades. Slopes are gentle in the Willamette Valley.

The Western Cascade Province is characterized by a rugged topography with irregular ridges and deep narrow valleys. The rocks are mostly volcanics.

Throughout the Eugene SYUs, slopes range from 0 to 100 percent and average about 65 percent. Elevations range from 15 feet west of Mapleton and 385 feet at Pioneer Villa to 2,590 feet at Roman Nose Mountain, 3,690 feet at Goat Point and 4,725 feet at Huckleberry Mountain.

SOILS

A generalized soils map, which contains 24 broad groupings of soils, is shown as Figure 2-2. This map shows a general view of the major soils in the Eugene SYUs.

Soils within the Eugene SYUs are generally capable of producing abundant plant growth. Most soils have a high content of organic matter, moderate to high nutrient levels and medium bulk densities (1.1 to 1.3 gm/cm). Soils at high elevations, however, are often low in organic matter and nitrogen.

Dry ravelling of soil materials, landslides and soil surface erosion occur naturally throughout the Eugene SYUs. Total soil loss from these factors in the undisturbed forests is estimated to be 0.06 to 0.30 tons per acre per year (t/ac/yr). Soil loss and loss of soil productivity have accelerated as a result of timber harvesting and road building. Eugene District experience has shown that in areas where road construction has taken place and fill-slopes have revegetated, soil loss is approximately 10 t/ac/yr.

The two major kinds of mass movement of soils in the Eugene SYUs are slumps and debris avalanches. Slumps are one or more blocks of soil that have rotated out of a hillside along a bowl-shaped failure plane. Debris avalanches are the rapid movement of incoherent soil, rocks and forest debris down steep draws. Soils that are associated with debris avalanches are usually those loamy and/or gravelly soils formed over sandstone, green tuffs or breccias on 80 percent or greater slopes. Debris avalanches occur on the following soils in the SYUs: Bohannon - Preacher - Digger association (see Figure 2-2), and inclusions of Jason and Umpcoos soils.

WATER RESOURCES

The Eugene SYUs lie within three major hydrologic basins, consisting of eight smaller basins (Figure 2-1) There are 178,540 acres of BLM-administered land drained via the Willamette Basin, 132,631 acres drained via the Northern Oregon Coastal Basin and 5,485 acres are drained by the Southern Oregon Coastal Basin. Within these large watersheds, ODEQ has identified a number of smaller streams that have problems with debris, algae growth, sedimentation, bank erosion and elevated temperatures. The rivers and creeks with non-point water quality problems are shown in Table 2-3. High sediment loads and streambank erosion occur during periods of peak flow (winter and spring), while problems of elevated temperatures and nuisance algae occur during periods of low flow (summer).

Table 2-3 Water Quality Problems

River or Creek	Hydrologic Basin [1]	Excessive Debris	Algae and Aquatic Plants	Streambank Erosion	Sedimentation	Elevated Water Temperatures
Willamette River	03		X			
Mohawk River	04		X	X	X	X
Middle Fork Willamette River	01	X	X		X	
Coast Fork Willamette River	02		X		X	X
McKenzie River	04				X	
Wildcat Creek	206				X	X
Fall Creek	01	X				X
Winberry Creek	01	X				X
Camp Creek	04					X
Sharps Creek	02			X		
Row River	02				X	
Lost Creek	01				X	X
Mosby Creek	02				X	X
Siuslaw River	206		X	X		X
Coyote Creek	03	X	X	X		X
Long Tom River	03		X	X	X	X
North Fork Siuslaw River	206			X		
Esmond Creek	206				X	
Lake Creek	206	X		X	X	X

Source: ODEQ 1978; BLM URA

[1] See Figure 2-1.

Sediment losses from the SYUs depend on a combination of many watershed variables. Within the Eugene SYUs, which are mostly forested, a small portion of the sediment produced is attributable to purely natural forces.

VEGETATION

The SYUs are located in the Northwest Coastal Coniferous Sub-biome, which is the most densely forested region in the Coniferous Biome. Characterized by easy regeneration and rapid growth, it produces trees of impressive sizes. The lower vegetative layers are usually poorly developed except where open canopies encourage a lush understory of grasses, shrubs and herbaceous species. Additional information may be found in the BLM Timber Management FEIS.

Terrestrial Vegetation

For purposes of this EIS, vegetation is generally described in terms of "zones" adapted from those identified by Franklin and Dyrness in **Natural Vegetation of Oregon and Washington** (1973). A detailed description of each zone and plant community listed below may be found in that source or from data prepared in the Eugene District.

Portions of three major vegetative zones, Pacific Silver Fir, Western Hemlock and Interior Valley are found within the SYUs.

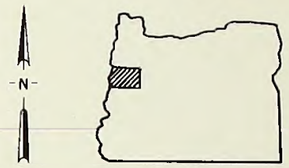
The Pacific Silver Fir Zone is limited to a few sections along the southern boundary of the Upper Willamette SYU where elevations reach 4,000 feet. This zone occupies sites which are wetter and cooler that those found in the adjacent Western Hemlock Zone. Vegetative community development processes of the two zones are similar in composition. Commercial conifer species found in this zone consist of; pacific silver fir, western hemlock, Douglas-fir, noble fir, western red cedar and western white pine.

The Western Hemlock Zone extends throughout the SYUs at all elevations. It is famous for its subclimax species, Douglas-fir, which is often the sole dominant tree in the forest. As a pioneer species, Douglas-fir normally constitutes a seral (successional) stage during the vegetative community development process. This zone encompasses six major plant communities with various associations of trees, shrubs and forbs relative to specific climatic

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT

SIUSLAW AND UPPER WILLAMETTE SUSTAINED YIELD UNITS

Eugene Environmental Impact Statement Area
1982



LEGEND

PHYSIOGRAPHIC PROVINCES

BOUNDARY

Western Cascade
Willamette Valley
Oregon Coast Range

HYDROLOGIC BASINS and SUB-BASINS

BOUNDARY

Willamette Basin
- 01 Middle Fork Willamette Sub-basin
- 02 Coast Fork Willamette Sub-basin
- 03 Upper Willamette Sub-basin
- 04 McKenzie Sub-basin
- 06 South Santiam Sub-basin

Northern Oregon Coastal Basin
- 204 Siletz-Yaquina Sub-basin
- 205 Alsea Sub-basin
- 206 Siuslaw Sub-basin
- 207 Siltcoos Sub-basin

Southern Oregon Coastal Basin
- 301 North Umpqua Sub-basin
- 303 Umpqua Sub-basin

PHSIOGRAPHIC PROVINCES AND HYDROLOGIC BASINS

FIGURE 2-1

Scale
0 5 10 Miles

LEGEND

AREAS DOMINATED BY EXCESSIVELY DRAINED TO POORLY DRAINED, NEARLY LEVEL SOILS OF FLOOD PLAINS AND ALLUVIAL BOTTOMLANDS.

1 - Chehalis-Cloquato association, 0 to 2 percent slopes
2 - Newberg-Cloquato-Camas association, 0 to 2 percent slopes
3 - Abiqua-McAlpin association, 0 to 5 percent slopes
4 - Waldo-McAlpin association, 0 to 2 percent slopes
5 - Bashaw-Natroy association, 0 to 2 percent slopes
6 - Nehalem-Nestucca-Brenner association, 0 to 2 percent slopes
7 - Braillier-Brenner association, 0 to 2 percent slopes

AREAS DOMINATED BY WELL-DRAINED TO POORLY DRAINED, LEVEL AND NEARLY LEVEL SOILS OF THE WILLAMETTE VALLEY TERRACES.

8 - Malabon-Salem association
9 - Awbrig-Coburg association
10 - Oxley-Courtney association

AREAS DOMINATED BY WELL-DRAINED TO EXCESSIVELY DRAINED, UNDULATING TO STEEP SOILS OF THE COASTAL TERRACES AND BEACHES.

12 - Duneland association
13 - Westport-Bullards-Yaquina association, 3 to 30 percent slopes

AREAS DOMINATED BY WELL-DRAINED TO MODERATELY WELL-DRAINED SHALLOW TO DEEP SOILS OF THE NEARLY LEVEL TO STEEP LOW FOOTHILLS AND HIGH TERRACES OF THE WILLAMETTE VALLEY.

15 - Veneta-Salkum association, 0 to 20 percent slopes
16 - Philomath-Hazelair-Bellpine association, 2 to 30 percent slopes
17 - Nekia-Bellpine-Ritner association, 2 to 60 percent slopes

AREAS DOMINATED BY WELL-DRAINED MODERATELY DEEP TO VERY DEEP SOILS OF THE GENTLY SLOPING TO STEEP DEEPLY DISSECTED CASCADE AND COAST RANGES.

18 - Peavine-Honeygrove-McCully association, 3 to 45 percent slopes
20 - Kinney-Bohannon-Klickitat association, 30 to 70 percent slopes
21 - Bohannon-Preacher-Digger association, 3 to 90 percent slopes

AREAS DOMINATED BY WELL-DRAINED TO EXCESSIVELY DRAINED MODERATELY DEEP TO SHALLOW COOL AND COLD SOILS OF THE HIGH CASCADE PLATEAU AND RIDGES.

22 - Keel-Hummington association, 30 to 75 percent slopes

Note: Soil data shown only within Lane Co. and SYU Boundary

Location Map

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT

SIUSLAW AND UPPER WILLAMETTE SUSTAINED YIELD UNITS

Eugene Environmental Impact Statement Area
1982

FIGURE 2-2
GENERAL SOILS

conditions such as aspect, moisture, soil type and depth, etc. These communities are listed on a site moisture gradient from dry to wet:

a. Douglas-fir, ocean spray
b. Western hemlock, golden chinkapin
c. Western hemlock, Pacific rhododendron, salal
d. Western hemlock, Pacific rhododendron, Oregongrape
e. Western hemlock, swordfern, Oregon oxalis
f. Western red cedar, western maidenhair fern, ladyfern

The Interior Valley Zone includes the lowlands and valley bottoms enclosed by the Cascade and Coast Ranges. Plant communities vary from grasslands and oak-madrone woodlands in low areas to conifer forests on the slopes. Frequent associates to these plant communities are Douglas-fir, incense cedar, ocean spray, Oregongrape and rye grasses.

Riparian habitat occupies the transitional terrestrial areas from the water's edge to the better-drained slopes. Vegetation in these areas range from a few aquatic species and the hardwood-western red cedar-hemlock type, to the predominant Douglas-fir stand usually found on the slopes.

Habitat stratification for all forested land of the entire Eugene Area is depicted in Table 2-4. The entire Eugene Area includes all lands in Lane County and the lower third of Linn County. Acreages listed are a composite of all public and private ownerships obtained from several sources (USFS; OSDF; OSDT) as well as the BLM forest inventory. The acreages of BLM-administered lands are shown for comparison.

Table 2-4 Existing Forest Habitat Stratification of Entire Eugene Area (Acres)

Habitat Age	BLM [1]	All Lands
Grass/Forb (non-stocked and 0-7 years)	34,300	339,200
Brush/Seedling (8-15 years)	30,100	299,100
Pole/Sapling (16-45 years)	109,500	651,000
Young Second Growth (46-115 years)	59,100	433,000
Mature (116-195 years)	26,400	467,100
Old Growth (196+ years)	48,500	441,600

[1] Based on 1978 inventory (Appendix C, Table C-1).

Source: USDI, BLM; USDA, FS; Oregon State Department of Forestry; Oregon State Department of Transportation (Parks and Recreation Branch)

The old-growth forests existing today are complex ecosystems which have evolved by natural selection through successional stages during the vegetative community development process. Evidence now points to the simultaneous evolution of mycorrhizal tree hosts, hypogeous fungi, and small mammals that function as a transport mechanism for the fungi.

Considerable research is required to fully understand these relationships and their importance to long-range timber production. It now appears that dispersal of mycorrhizal fungi by small mammals may be a critical factor in forest plantation establishment and survival in some instances (Maser et al. 1978). The functioning of the old-growth forest as a system, however, has not yet been studied in depth. For example, as recently as 10 years ago, nothing was known about sources of nitrogen in old-growth stands. It is now known that lichens which inhabit the canopy of live old-growth trees fix significant amounts of nitrogen which ultimately become available to the whole forest through leaching, litter fall and decomposition. Also, lichens and wood-dwelling bacteria on standing dead trees and logs have recently been identified as significant sites of nitrogen fixation (Franklin et al. 1981).

Seed zones are accepted as generally encompassing a geographic area within which the factors affecting reforestation and subsequent growth are relatively homogenous (Appendix B). Table 2-5 indicates the seed zones and elevational intervals involving BLM-administered lands in the Eugene SYUs.

Wetland and Aquatic Vegetation

Wetlands are those areas inundated by surface or ground water at a frequency sufficient to produce a saturated or seasonally saturated soil condition. Examples of wetlands include marshes, swamps, bogs, wet meadows and natural ponds. Sedges, grasses, rushes, skunk cabbage, cattails and algae are typical wetland and aquatic plants.

Sensitive, Threatened and Endangered Plants

Endangered plants are those species that are in danger of extinction throughout all or a significant portion of their range. Threatened plant species are those that presently are not endangered but are likely to become so within the foreseeable future throughout all or a significant portion of their range.

Table 2-5 Seed Zones and Elevational Intervals in the Eugene SYUs

Elevation Interval	Seed Zones [1]							
	061	062	252	262	471	472	481	482
0 to 500		X	X					
500 to 1,000	X	X	X	X	X			
1,000 to 1,500	X	X	X	X	X	X	X	X
1,500 to 2,000	X	X	X	X	X	X	X	X
2,000 to 2,500	X	X	X	X	X	X	X	X
2,500 to 3,000	X			X		X	X	X
3,000 to 3,500							X	X
3,500 to 4,000							X	X

[1] See Appendix B, Figure B-1.

Table 2-6 Sensitive Species Currently Under Review for Possible Listing

Scientific Name	Common Name	Candidate For [1]	Observations [2]
Aster curtus	Curtus aster	T	B
Aster vialis	wayside aster	E	B
Cypripedium montanum	mountain lady's slipper	T	B
Frasera umpquaensis	Umpqua frasera	T	A
Lathyrus halochlorus	thinned-leaved peavine	T	A
Lomatium bradshawii	Bradshaw's lomatium	T	A
Sidalcea cusickii	Cusick's sidalcea	T	A

[1] Threatened (T), endangered (E).
[2] Observed; on BLM - A, on other lands in the SYUs - B, Unobserved - C.

Sensitive plants are those species not yet officially listed but are undergoing a status review (see Glossary, Sensitive Species).

Botanical surveys for sensitive, threatened and endangered plants were conducted on the Eugene District from 1978 through 1980 and are continuing. No plants listed or proposed as threatened or endangered under the Federal Endangered Species Act are known to occur in the EIS area. Several species observed in the EIS area are currently under review for listing as threatened or endangered by the U.S. Fish and Wildlife Service (Table 2-6). The final status of these species will be determined as sufficient data are collected.

ANIMALS

Terrestrial Animals

Animal distribution, diversity and abundance are dependent on various factors; vegetation is of primary importance. Each vegetational zone described in the previous section contains a variety of plant communities which may be in different successional stages. Each successional stage has a unique structure and it is primarily this structure to which animal communities respond. Structure is a result of many things--tree species diversity, understory vegetation, openings in the canopy, layers of vegetation, presence of snags and down logs are some of the items causing structure. While all

successional stages have structure, mature and old growth provide the most while pole/sapling and young second growth provide the least. The differences in plant communities, successional stages and structure provide habitat diversity and environmental variables and account for the variety of animals found in the EIS area.

Successional stages are dynamic. They are always progressing toward their climax form and during this progression their animal components are also changing. A climax western hemlock forest supports a very different animal association than it did in its early successional stage several hundred years before. Progress toward climax can be curtailed at any point by outside influences, either natural or artificial. For instance, fire or logging may set back succession, and those animal species associated with the current stage will be replaced with those adapted to exist in the early successional stages.

Modifying or removing one particular stage, e.g., old growth, has a profound effect on those individuals and species occurring there. It is recognized that these effects do not stop with just those species, as the ecosystem as a whole is altered by the modification of one of its parts. Certain results may be harmful to some species and beneficial to others, but all are affected.

Grass/forb and shrub/seedling are the earliest successional stages in the forest system. Lands are dominated by grass and forbs in the earliest years although shrubs may be present. As time progresses, shrubs and seedlings out compete the grasses and forbs. Food for grazers and browsers is present and many habitat niches for small vertebrates occur, particularly if logs, snags and residual trees remain. Environmental variables (structure) are moderate. These two stages may last 15 to 20 years.

Pole/sapling and young second growth forests replace the previous low-growing open-type vegetation. Forage and browse production is greatly reduced as canopy closure increases. Species diversity decreases and environmental variables are low. However, when left in its natural state, habitat for many species of animals is provided. For example, sharp-shinned and Cooper's hawks select these young even-age stands as nesting habitat if of suitable density. Because of past thinning, existing pole/sapling and young second growth only support about 50 percent of the nesting potential for these species.

After about 120 years, the forest is considered mature and is characterized by the presence of large trees beginning to show decadence. As the forest continues aging into old growth, the canopy opens and snags and large down logs are present. A well developed understory is present and there are several canopy layers. Many species of epiphytic plants are present. Here environmental variables are at their highest, and diversity of both plant and animals is great. Lang (1980), after an extensive literature review, concluded that "old-growth Douglas-fir forests of the Pacific Northwest possess a set of structural and functional characteristics not found in stands younger than about 200-years old. Structural characteristics provide habitats for certain distinctive plant and animal species; they include large, old trees; snags, fallen logs; and complex vegetation structure . . . The wildlife species composition of old-growth ecosystems includes six species of birds restricted to old growth or mature successional stages. Five mammal species also may be restricted to those stages but available information is inadequate to be certain about these relationships."

There are 27 species of amphibians and reptiles, 97 species of birds and 57 species of mammals that occur in the EIS area that are directly dependent on forest habitats or interspersed non-forest habitats that often are heavily impacted by timber management activities. Some species of animals are quite restricted in their habitat requirements, while others have a wide tolerance. For instance, the robin occurs in most habitat types while the northern spotted owl is much more restricted. A list of these species and some information on their habitat requirements is available in the Eugene District Office.

From the perspective of all ownerships, the progression toward climax in the SYUs has been halted and reversed primarily by planned timber management activities. In 1930, for example, most of the forest land acreage supported mature and old-growth stands. The most recent inventories (Appendices D and E) show a greater diversity (Table 2-7) than that which existed under more "natural" conditions 50 years ago.

The present diversity, however, is a transitory condition. The forest management activities that created the current diversity will, if continued, result in a situation where the oldest successional stage is second growth (46-115 years old).

Habitat structure for all lands, regardless of ownership or administration, cannot be accurately calculated. However, based on data from a variety of sources, habitat structure for the entire area was estimated for all forest lands and is shown in Table 2-7. The "all lands" category consists of forest lands within Lane County and the southern one-third of Linn County. Total land area is approximately 2.6 million acres. Bureau forest lands in the table approximate 307,900 acres.

Old-growth forests provide optimum habitat for a variety of animal species and are important to the entire forest ecosystem (See Appendix B; Seral Stage Distribution Concept). Old-growth habitat totals 48,500 acres or 16 percent of Bureau-managed forest lands in the Eugene SYUs. (Based on 1978 inventory data, current amounts are estimated to be 20 to 40 percent less.)

Table 2-7 Habitat Structure of Forest Lands, 1978 Inventory, in the Eugene SYUs (by percent)

Habitat Age	All Forest Lands	BLM	BLM Habitat as a Percent of All Forest Lands *
Grass/Forb (non-stocked and 0-7 years)	13	11	10
Brush/Seedling (8-15 years)	11	10	10
Pole/Sapling (16-45 years)	25	35	17
Young Second Growth (46-115 years)	16	19	14
Mature (116-195 years)	18	9	6
Old Growth (196+ years)	17	16	11

* This column indicates, for example, that while 16 percent of BLM land is old growth, this is 11 percent of all old growth in the defined area.

Source: USDI, BLM; USDA, FS; Oregon Department of Forestry; Oregon Division of Parks and Recreation.

Within the area defined by the SYUs (about 1.1 million acres), BLM is the only significant land managing agency, hence, is the sole provider of habitat for old-growth dependent species.

To maintain at least minimum viable populations of those animal species that find their optimum habitat in mature and/or old-growth forest, it is estimated that approximately 15 percent of the forested land base should be in these older seral stages.

For maximum benefits, this acreage should be distributed in large blocks, approximately 1,000 acres in size at 6 to 8 mile intervals, with smaller blocks, 50 to 100 acres in size scattered between them. This provides for species needing large expanses of habitat as well for those needing less. It also provides a continuum of habitat so that isolation will not occur. If the large blocks are located in areas that would allow ties with other potential habitat blocks on other BLM Districts or U.S. Forest Service lands, their value is increased.

A model was developed (available in the Eugene District office) incorporating large and small block objectives and geographical ties, and was tested against the existing situation and all alternatives. One hundred percent would provide the minimum for maintaining viable populations of animal species requiring mature and/or old-growth habitats. The existing situation for the Eugene District tested at 118 percent for large blocks and 164 percent for small blocks, while geographic ties were at 120 percent. Analysis of each alternative appears in Chapter 3, Wildlife.

Other types of habitat exist and can be modified by forest management practices. Some of these habitats are unique because of their scarcity in the EIS area. Snags are of special concern. Snags provide optimum habitat for 38 species and are used to some extent by 12 other species of birds and mammals that use forest habitats in the SYUs. That cavity-nesting birds feed on insects and play an important part in control of forest insect pests has been well reviewed by Thomas (1979).

Under natural conditions, snags occur throughout the forest as a result of fire, disease and other factors. Timber harvest practices generally result in their removal for safety and fire prevention. Recent snag surveys by district personnel revealed an average of 0.04 snags per acre in coniferous forests less than 15 years of age under BLM administration. It has been calculated that habitat for snag-dependent species is currently at 34 percent of potential. It has been stated by Thomas (1979 p.72) that "management below the 40 percent level may be too low to maintain self-sustaining populations of a species."

Riparian habitats are extremely important. Of the 181 species of terrestrial vertebrates using forest habitats in the planning area, 49 find their optimum habitat in riparian habitat while another 102 species use it for

part of their overall needs. In western Oregon, riparian habitats vary in width; generally, the larger the stream, the wider the riparian habitat. Vegetation within these areas includes plants only found in association with water as well as others including hardwoods and merchantable softwoods.

Currently, there are about 56,700 acres of riparian habitat on BLM-administered lands in the Eugene District. Approximately 41,000 of these acres are along small first and second order streams. The riparian habitat on third order and larger streams represents about 5 percent of the forest land base. About 60 percent of this has been altered by past timber management practices and is in less than optimum condition.

Upland hardwoods add greatly to habitat diversity both structurally and from a species standpoint. Of the 181 species using forest habitats in the SYUs, 13 find their optimum habitat there and another 72 use it for part of their life needs (also see Maser and Franklin 1974). Currently there are about 11,600 acres that are composed primarily of hardwood located on Bureau-administered lands in the SYUs. There are about another 27,500 acres of mixed conifers and hardwoods in which the hardwood component is from 50 to 75 percent.

Roosevelt elk are a very important recreational species in the SYUs. Elk numbers are not evenly distributed throughout the District. They have spotty distribution on the east side but are more evenly distributed on the west side with concentrations in the Siuslaw drainage and its tributaries from Alma to Austa. The approximately 32,000 acres of elk habitat on BLM-administered lands in this area are currently in the following condition:

Forage Area	Hiding and Escape Cover	Thermal Cover	Survival Cover*
0-17 years	18-39 years	40-119 years	120+ years
26 percent	16 percent	22 percent	36 percent

* Survival cover can be substituted for thermal cover but not the other way around.

Source: USDI, BLM Eugene District personnel

The older forest (120+) component is extremely important if optimum or near optimum populations of elk are to be developed and/or sustained. In times of extreme temperatures, it functions as survival cover providing forage, temperature moderation and snow interception (Jenkins and Starkey 1980; DeCalesta and Witner 1980; Smithey et al. 1982). Much of the adjacent lands under other ownership have been cut over and provide forage and escape cover. It is primarily Bureau-managed lands that supply the survival cover component.

Fish

Habitat conditions for fish have been degraded by past logging, road construction, fires and salvage treatments. As a result of recent timber management practices and reestablishment of vegetation, the overall condition of the fish habitat has somewhat stabilized, but for some species and in some stream systems both habitat and wild fish populations continue to decline.

Salmonids are the most important group of fish in the SYUs. For some species of salmonids, wild fish stocks have been reduced to the point where introduction of hatchery fish has been necessary to supplement the wild stock. It is estimated that fish habitat in the Eugene District is currently at 50 percent of optimum for native salmonids. Table 2-8 reflects habitat and population information about salmonids in the SYUs.

Many other species of fish are present in the planning area. Sculpins, suckers, dace and squawfish are some examples. These species have no direct commercial or sport value. Little information on populations is available. Some species may compete with trout and salmon for food and space, while others are used by the trout and salmon as food.

Threatened and Endangered Animals

There are three species of animals officially listed by the U.S. Fish and Wildlife Service and/or the State of Oregon as threatened or endangered that occur at least occasionally in the Eugene SYUs. Table 2-9 lists those species and their status.

The bald eagle is a regular inhabitant of the Eugene SYUs and one pair is known to nest and one other pair thought to nest on BLM-administered land. In addition, a winter roosting area used by up to 15 eagles is located on BLM-administered lands.

Peregrine falcons are occasionally seen in the SYUs. None are known to nest in the area although there are two historic nest sites located adjacent to BLM-administered lands.

Table 2-8 Cold Water Fish Habitat and Populations [1]

Species	Stream Miles		Condition of Habitat [2]				Habitat	Wildfish [3] Population Trend		Current [3] Stocking	
	BLM	Other	Excellent	Good	Fair	Marginal	Trend	Westside	Eastside	Westside	Eastside
Chinook	46	237	30%	55%	10%	5%	Stable	Stable	Declining	No	Yes
Coho	138	447	5%	25%	50%	20%	Stable to Declining	Declining	N/A	Yes	No
Steelhead	107	396	10%	40%	40%	10%	Stable to Declining	Declining	Stable	Yes	Yes
Trout	392	1,334	5%	20%	45%	30%	Declining	Stable	Declining	Yes	Yes

[1] Condition and trend are for all lands.
[2] Stream conditions depend on riparian vegetation, abundance and diversity of instream structure, number and quality of pools, amount of sediment on bottom substrata, spawning gravels, stability of bank and channels and other characteristics.
[3] Because of differences, data is displayed separately for western and eastern parts of the district.

Source: BLM Eugene District personnel.

Table 2-9 Threatened and Endangered Species of the Eugene SYUs

Species	Federal Status	Oregon Status
Northern bald eagle *Haliaeetus leucocephalus alascanus*	T	T
Peregrine falcon *Falco peregrinus*	E	E
Northern spotted owl *Strix occidentalis caurina*	-	T

T - Threatened
E - Endangered

The northern spotted owl is a permanent resident of the SYUs. On Bureau-administered lands, there are 42 habitat units, each known to support one pair of owls. An additional 12 locations have been identified as occasionally containing owls. These may be juveniles or single birds, as the inconsistency of locating these birds and the quality of the habitat makes it unlikely these areas are capable of supporting breeding pairs.

An additional 72 pairs of owls have been recorded on lands of other ownership within the "all lands" area, primarily on lands administered by the U.S. Forest Service.

No habitat considered critical under Section 4 of the Endangered Species Act of 1973, as amended, has been declared or nominated within the SYUs.

RECREATION

Developed recreation sites on public land include Lake Creek, Whittaker Creek, Shotgun, Turner Creek, Clay Creek, Haight Creek and Sharps Creek (see Figure 1-1). Each site has facilities for overnight camping and/or picnicking. Opportunities are also available for dispersed camping and picnicking throughout the SYUs.

High quality stream fishing occurs on public lands along the McKenzie River, its tributaries and Willamette River tributaries. BLM-managed habitat contributes to the excellent fishing on the Siuslaw River and Lake Creek downstream from public lands. Lake fishing for warm water species is available at Hult Pond.

Hunting activity on public lands is for deer, elk, bear and upland game. Hunter success is affected by game populations, ease of movement and shooting opportunities. High quality big game hunting opportunities are available in the Wolf Creek, Lorane, Mohawk-Calapooya and Big River-Mosby Creek areas.

Most general sightseeing use occurs in association with travel along major roads. Some people also visit public lands with specific sightseeing goals or may include it as a part of other activities. Examples of such areas with opportunities for this use include the McKenzie River, Lake Creek Falls, Fall Creek and Teeter Creek Springs.

High quality opportunities are available for water sports, rock collecting and off-road vehicle (ORV) riding. Outstanding opportunities for floatboating are found at the McKenzie River. Agate and jasper collecting is popular in the London area. Within the SYUs, about 6,600 visitor days annually are attributed

to off-road vehicle use. The best areas on public land for ORV (especially motorcycle) use include Coburg Hills, Low Pass-High Pass and Lorane-Gowdyville.

The 6,000 acre Windy Peak area, located in the Coast Range about 28 miles west of Eugene, is a steep, heavily timbered and relatively unroaded area with moderate values for primitive recreation. However, the area's irregular configuration precludes much sense of isolation to the visitor.

The Nationwide Rivers Inventory prepared by the Heritage Conservation and Recreation Service (HCRS) and National Park Service (NPS) has identified the Siuslaw River from its source to Lake Creek as a potential National wild, scenic or recreational river crossing public land within the SYUs (USDI, HCRS 1980).

Table 2-10 Estimated Visitation Attributed to Major Recreation Activities

Activity	Current Visitation [1] (Visitor Days/Year) Total [2] (Lane County)	BLM (Eugene District)
Hunting		
Deer	193,930	20,750
Elk	19,240	1,390
Bear	22,600	3,010
Upland game	70,000	5,640
Fishing		
All anadromous	371,270	17,660 [3]
Resident cold water	358,710	17,630 [3]
Resident warm water	12,900	2,810
Camping	1,216,000	19,400
Other Day Use [4]	9,839,400	79,590
TOTAL	12,104,050	167,880

[1] Based on data collected between 1972-1977.
[2] Total visitation includes use in the coastal region where public lands are limited.
[3] Includes downstream fishing for fish reared in BLM-managed streams.
[4] Total area day use visitation excludes urban and semi-urban activities not generally associated with forest lands administered by BLM.

CULTURAL RESOURCES

BLM is required by law and executive order to identify, protect and enhance significant cultural resources on public lands. A number of procedures, including those specified in 36 CFR 800.4(a), were used to identify the cultural resources within the SYUs.

A survey of existing cultural resource information (Class I survey) has been completed for the SYUs (Beckham et al. 1981) through a compilation of the area's existing site record data. A thorough survey to locate and identify cultural resources is accomplished prior to ground disturbance or ownership changes. The results of this intensive survey are documented in each site specific environmental assessment.

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historic Places are described in 36 CFR 1202.6.

While little of the area has been field surveyed for prehistoric resources due to its steep, heavily forested terrain, there are 87 recorded prehistoric sites on or near public land within the SYUs. Most are trailside and/or hunting camps associated with Indian use of upland resources. An area's available resources such as water, plant and animal foods, workable stone or amenable terrain probably determined the nature and location of sites.

There are 195 inventoried historic sites on or near BLM-administered land within the SYUs (Beckham et al. 1981). Most of the sites have not been formally recorded and are in need of further documentation. Most historic sites in the SYUs relate to fur trade, settlement, transportation, mining and logging. None of the historic sites on public land are currently listed on the National Register of Historic Places.

No important or scientifically unique paleontologic sites have been identified in the SYUs (USDI, BLM 1981). However, all reports of fossil-bearing deposits are examined by qualified personnel to avoid destruction of significant resources.

VISUAL RESOURCES

Visual resources are the land, water, vegetation, animals and the other features (as described in this chapter) that are visible on public lands. Within the SYUs, the Bureau's ability to manage for an area's overall scenic quality is often limited due to checkerboard land ownership patterns and the fact that most intermingled private land is utilized for intensive timber management. However, visual resource management (VRM) objectives have been developed based on scenic quality, visual sensitivity and distance zone (see Glossary). Examples of high scenic quality and visually sensitive areas within view of public land include Fall Creek Reservoir, Lookout Point Reservoir, Sharps Creek Recreation Site, Lake Creek Falls, McKenzie River, Dorena Reservoir, Cottage Grove Reservoir, Triangle Lake and portions of the viewshed from Interstate 5.

VRM classes specify management objectives and allow for differing degrees of modification. Objectives for each VRM class follow:

Class I: Provides primarily for natural ecological change (highest level of protection). Generally includes highly scenic and/or highly sensitive areas. Less than 1 percent of the public land in the SYUs is in this class.

Class II: Changes in any of the visual resource basic elements (see Glossary) caused by a management activity should not be evident in the characteristic landscape. A change may be seen but should not attract attention (retention of scenic quality). Generally includes areas with high to moderate scenic quality and/or sensitivity. About 13 percent of the public land in the SYUs has values to qualify it for consideration for Class II management.

Class III: Changes in the basic elements caused by a management activity may be evident in, but should remain subordinate to, the existing characteristic landscape (partial retention of scenic quality). Generally includes moderate scenic quality and/or sensitivity. About 25 percent of the public land in the SYUs has values to qualify it for consideration for Class III management.

Class IV: Changes may attract attention and be dominant landscape features but should reflect those basic elements inherent in the characteristic landscape (modification of scenic quality--lowest level of protection). Generally includes areas with moderate to low scenic quality that are seldom seen. VRM Class IV incorporates about 62 percent of the public lands in the SYUs.

VRM class delineations for the SYUs are available in the Eugene District Office.

WILDERNESS VALUES

Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more that have wilderness characteristics are to be reviewed within 15 years for possible wilderness designation. The 1976 Act also states that in the event of inconsistency between it and the O&C Act in so far as they both may relate to management of timber resources, the O&C Act prevails. Accordingly, the wilderness review provisions do not apply to revested Oregon and California Railroad Grant lands suitable for sustained yield management as commercial timber lands.

No areas within the SYUs are designated wilderness study areas. The intensive wilderness inventory and accompanying maps for Oregon and Washington are available in the Oregon State Office.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Areas of Critical Environmental Concern (ACECs) are areas within the public lands where special management attention is required to protect important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA Section 103(a)). Designation of an area as an ACEC does not necessarily preclude development but rather ensures the protection of sensitive values in those cases where appropriate development may take place. Following designation, activity plans are prepared to translate special management requirements for each area into on-the-ground actions.

Of the areas nominated for ACEC consideration during the Eugene District's planning process (see Table 2-11), seven were found to be qualified for ACEC designation. The decision to designate any or all of these areas as ACECs will be part of the Management Framework Plan decision for the SYUs, to be made following completion of this EIS (see Chapter 1, Implementation). Site-specific ACEC management plans will be developed and assessed in EAs following completion of the final land use allocations and timber management plan.

SPECIAL AREAS

Four areas (Mohawk, Fox Hollow, Camas Swale and Elk Meadows) have potential for Research Natural Area (RNA) designation. Collectively, the first three areas would preserve examples of Willamette Valley foothills forest ecosystems. The 293-acre Mohawk area represents a moist shady microclimate with old-growth forest stands of Douglas-fir, hemlock and cedar. Fox Hollow is a 180-acre tract with sharply contrasting ecosystems. Old-growth fir predominate on the shady north slopes while the dryer crest and south slopes have a mix of pine, fir, cedar, madrone and oak. Camas Swale (280 acres) with its varied terrain offers a diversity of natural conditions represented by such species as fir, pine, chinquapin, cedar, madrone, maple and yew. Elk Meadows (205 acres), on the Calapooya Divide, provides unique wildlife habitat as a result of its diverse plant communities surrounded by old-growth silver fir and Douglas-fir forests.

The Mohawk, Fox Hollow and Camas Swale areas have been identified by the National Park Service (NPS) as potential National Natural Landmarks (Chilcote et al. 1976). Designation of a site as a National Natural Landmark (see Glossary), a

Table 2-11 Nominated and Potential Areas of Critical Environmental Concern

Site Name	Approximate Size (acres)	Description	Primary Resource Values	Remarks
QUALIFIED FOR ACEC DESIGNATION [1]				
1. Lake Creek Falls	3	Highly scenic waterfalls and swimming area	Scenic, Natural Hazard	
2. Elk Meadows	205	Meadow and shrub communities surrounded by old-growth fir; unique wildlife habitat	Botanic, Wildlife	Potential Research Natural Area (RNA)
3. Horse Rock Ridge	190	Large, grassy bald with diverse flora	Botanic, Wild life, Scenic, Cultural	
4. Long Tom	8	Willamette Valley oak and ash woodland/ grassland ecosystem; unique wildlife habitat	Botanic, Wildlife	
5. Fox Hollow	160	Douglas-fir/Ponderosa pine forest in the Willamette Valley foothills	Botanic	Potential RNA
6. Camas Swale	280	Douglas-fir forest in the Willamette Valley foothills	Botanic	Potential RNA
7. Mohawk	293	Fir, hemlock and cedar forest in the Willamette Valley foothills	Botanic	Potential RNA

[1] Two identification criteria (relevance and importance) derived from the Federal Land Policy and Management Act (1976) were applied to evaluate all areas nominated for ACEC designation. Areas nominated but not qualified for designation failed to meet the criteria as described in the August 1980 Final Guidelines for Areas of Critical Environmental Concern (USDI, BLM 1980). These areas include:
a). Older seral stage conifer forest b). Older seral stage 80+ years component c). Riparian habitat d). Coburg Hills e). Dorena bald eagle habitat f). Northern spotted owl habitat g). Siuslaw drainage Roosevelt elk habitat h). Teeter Creek Spring i). Siuslaw spring chinook habitat j). Pacific Flyway k). Greenleaf Creek watershed l). Blachly Forest Wayside corridor m). McKenzie corridor n). Windy Peak. Further information concerning these areas is available in the Eugene District Office.

program administered by the NPS, would not affect BLM jurisdiction to manage the area.

The 200-acre Vik Road, 70-acre Row River and 240-acre McGowan Creek tracts are currently utilized as environmental education areas (see Glossary). Trails and some other facilities have been constructed in the areas.

ECONOMIC CONDITIONS

During 1975 through 1977, logs from the Eugene District were trucked to distributions in Lane (93.3 percent), Linn (6.2 percent) and Douglas counties (.5 percent). Lane and Linn counties taken together are evaluated here as the regional economy affected by the action.

The forest products industry provides 12.1 percent of all employment and 20 percent of total personal earnings in Lane County. In Linn County, the harvesting and processing of forest products provides 16.1 percent of the employment and 23.5 percent of total personal earnings. The flow of BLM timber from lands administered by the Eugene District supports 7.0 percent of the wood products employment and 7.1 percent of the personal earnings in the two-county regional economy.

Description of the Regional Economy

The population of the region has increased more than 27 percent over the last decade and now exceeds 360,000 (Table 2-12). While paralleling a nationwide shift of population westward, the rate of growth in the region exceeded substantially the rate of growth in Oregon which, in turn, exceeded the population growth rate in the United States. Net migration accounted for 67 percent, 63 percent and 66 percent of the population increase for Lane County, Linn County and the region, respectively (Seidel, 1981). Recent data suggest a turnaround in migration patterns; Lane County was estimated to have a 3,354 net out migration between April 1980 and July 1981 (Center for Population Research and Census, 1982).

The immigration of the 1970's plus an increase in the proportion of women employed or seeking

Table 2-12 Population, 1960-1980

County	1960	1970	1980	Compound Annual Growth Rate 1960-70	Compound Annual Growth Rate 1970-80
Lane	162,890	213,358	275,226	2.7	2.6
Linn	58,867	71,914	89,495	2.0	2.2
Region	221,757	285,272	364,721	2.6%	2.5%
Oregon	1,768,687	2,091,533	2,633,105	1.7%	2.3%
United States	179,323,175	203,235,298	226,504,825	1.3%	1.1%

Source: U.S. Dept of Commerce Census of Population, years indicated.

Table 2-13 Average Size and Recent Growth of the Labor Force and Employment in Selected Industries in the Region

	Lane County Average Avg.	Lane County Compound Annual Growth 1972-1980 (5)	Linn Economy Average 1978-1980	Linn Economy Compound Annual Growth 1972-1980	Oregon Average 1978-1980	Oregon Compound Annual Growth 1972-1980
Civilian Labor Force	128,400	3.91	38,100	3.29	1,228,000	3.58
Total Employment	117,800	3.52	34,600	2.86	1,141,300	3.38
Wage & Salary Employment	104,000	3.66	30,600	3.27	1,035,600	3.77
All Manufacturing	20,700	-0.56	11,200	1.20	220,600	1.92
Lumber & Wood	13,800	-2.22	5,400	-0.79	77,200	-1.37
Other Durable Goods	3,500	6.97	3,300	4.37	88,000	5.17
All Non-Manufacturing	83,300	4.93	19,400	4.64	815,000	4.30
Trade	25,900	5.46	5,870	4.47	252,700	4.67
Services & Miscellaneous	19,300	7.23	3,700	5.23	184,200	5.65
Government	22,300	3.60	5,600	5.71	196,400	3.18

Source: Computations by EIS staff of data obtained from the Research and Statistics Section, Employment Division, Oregon Dept. of Human Resources. Total employment includes self-employed and proprietors. The other employment categories include only employees covered by either the Oregon Unemployment Insurance Law or the program of Unemployment Compensation of Federal Employees.

employment caused the labor force to grow faster than total employment (Table 2-13). For example, in Lane County, the annual rate of job creation was 3.52 percent while the labor force was increasing at 3.91 percent annually.

Employment and income growth in the region's trade and service sectors was strong from 1972-1980, paralleling statewide expansion in both categories. A decline in manufacturing employment in Lane County and a lack of significant growth in manufacturing employment in the regional economy during the decade are of local concern (Coopers and Lybrand, 1980; The Fantus Company, 1982). Employment in manufacturing sectors other than wood products increased by 7 percent during the decade and holds promise for renewed expansion when the economy rebounds from the current recession (Economic Consultants of Oregon, 1981). Overall, increases in non-manufacturing employment within the region provided the jobs which absorbed the growth of the 1970's.

Projections show long-term declines in Oregon lumber and wood products employment (Bruner and Hagenstein, 1981). Whether these declines can be offset by continued growth in the non-manufacturing sector and local programs promoting diversification in non-wood manufacturing is still unknown (Coopers and Lybrand; 1980, Economic Consultants of Oregon, 1981; The Fantus Company, 1982). Statewide, total employment in the lumber and wood products sector declined from 1972 to 1980 at a 1.37 percent annual rate while total employment in manufacturing increased by more than 29,100 jobs, an average annual increase of almost 2 percent.

Because lumber and wood products employment is 13 percent of tota! employment in the region and the sector's output is largely exported to national and international markets, local employment rises and falls markedly with shifts in the business cycle. Figure 2-3 highlights this variability by contrasting unemployment rates in Lane County, Linn County, Oregon and the United States--it shows that Lane and Linn Counties' unemployment rates are higher than Oregon's and the national average, and that gap

FIGURE 2-3 ANNUAL AVERAGE UNEMPLOYMENT RATES 1972-1981 (CALENDAR YEARS)

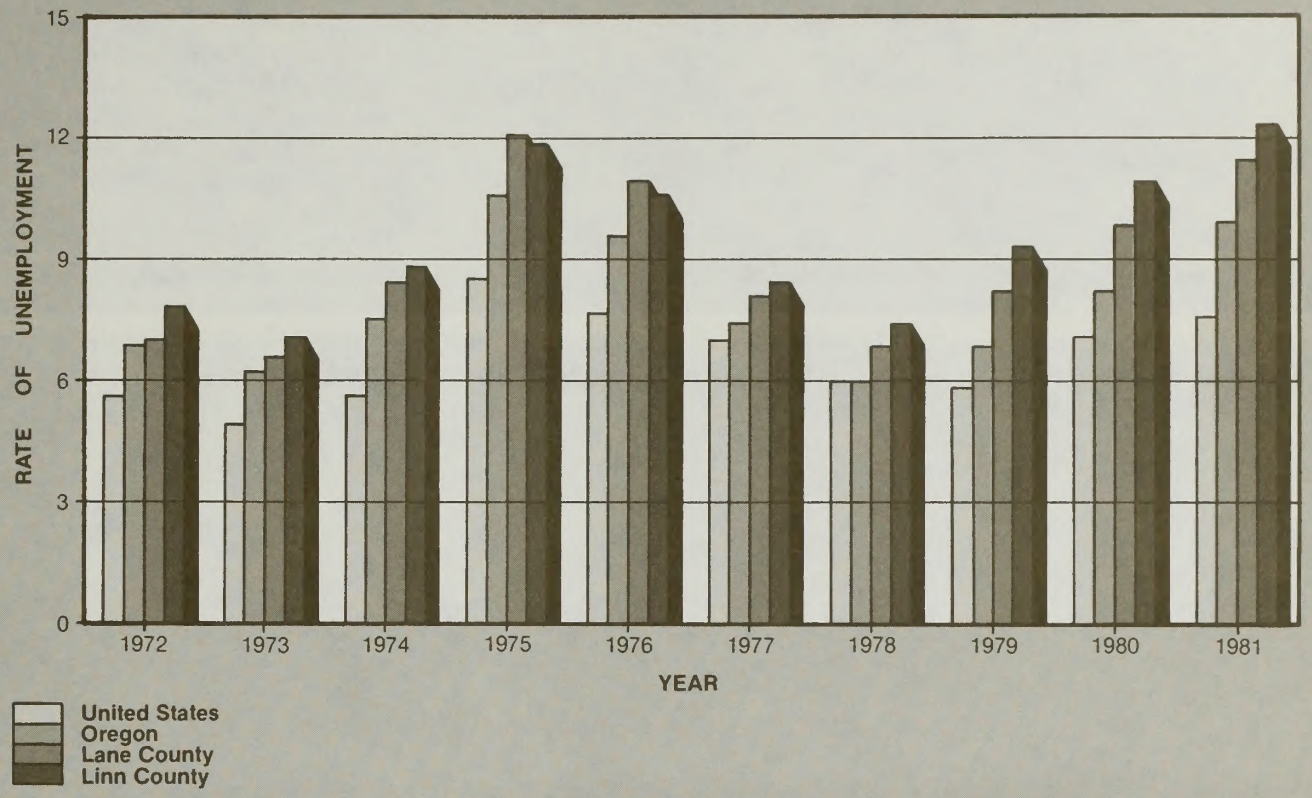


Table 2-14 Changes in Employment, January 1980 to December 1981

	Lane		Linn		Oregon	
	Amount	Percent	Amount	Percent	Amount	Percent
Wage & Salary Employment	-5400	- 5.2	-1330	- 4.3	-43,700	- 4.2
All Manufacturing	-3400	-16.8	-1070	- 9.6	-27,700	-12.7
Lumber & Wood	-3100	-23.1	- 360	-6.8	-19,200	-25.9
Other Durable Goods	- 500	-14.3	- 370	-10.5	- 8,800	- 9.6
All Non-Manufacturing	-2000	- 2.4	- 260	- 1.3	-16,000	- 1.9
Trade	- 300	- 1.2	+60	+ 1.1	-300	- 0.1
Services & Miscellaneous	- 200	- 1.0	+40	+ 1.1	+2,700	+ 1.4
Construction	-1200	-25.0	- 290	-21.0	-13,800	-29.4

Source: Computations by EIS staff derived from data provided by the Employment Division of the Oregon Department of Human Resources.

Table 2-15 Harvests, Sales and Receipts from BLM Timber in the Eugene District (1972-1981)

Fiscal Year	Sales (MMBF)	Removals (MMBF)	Value of Sales ($1,000,000)	Value of Receipts ($1,000,000)
1972	193.2	--	11.8	--
1973	231.7	235.8	26.4	--
1974	234.2	249.0	44.1	29.4
1975	215.2	109.7	35.1	15.0
1976	222.5	173.0	35.2	30.8
TQ	--	33.8	--	6.4
1977	214.4	199.1	42.3	35.2
1978	217.9	241.1	45.2	43.1
1979	214.7	176.7	64.1	35.4
1980	218.5	167.0	73.5	35.7
1981	205.8	164.5	53.9	67.0
Annual Average 1978-1981	214.2	187.3	59.2	45.3

Average Value of per M board feet removed: $242

Source: Eugene District monthly cutting reports and USDI, Bureau of Land Management. Public Land Statistics, various years.

tends to widen during economic recessions. Employment figures for 1981 underscore the effect that the current recession is having on the lumber and wood products and construction sectors (Table 2-14).

The Effects of Timber Harvest on Employment and Earnings

Timber-related industries play a large role in the region's economy. Approximately one out of nine workers in Lane County and one out of every six workers in Linn County harvests, processes or transports some type of wood product (ratio of lumber and wood products employment to total employment, Table 2-12). In contrast, for all Oregon workers, only one in every fourteen is employed in the wood products industry. In 1972, one of every 52 workers in the U.S. was involved in forest management, harvesting, primary processing or transportation and marketing of wood products (derived from Table A-43, Phelps, 1980).

The Eugene District plays a significant role in providing raw material to the region's lumber and wood products sector. From 1978-1981, an annual average of 187.3 MMBF was harvested from BLM land administered by the Eugene District (Table 2-15). For these years, this represented 13.8 percent of Lane County's average annual harvest from all ownerships and 1.1 percent of the same in Linn County (Table 2-16). In 1976, 15 percent of the logs processed in Lane County were from the Eugene District while 1.8 percent of Linn County's processing activity was based on logs from the District (USDI, BLM, 1980, Table FP-4).

Annually, the harvest of this 187.3 MMBF from District lands provides approximately 270 full-time jobs and $5.0 million in direct personal income in the two county region (Table 2-17). The processing of

timber harvested from the District's lands and sent to Lane and Linn county mills supports approximately 1,120 full-time jobs and $22.9 million in personal earnings each year. Reforestation of the District's harvested lands averaged the equivalent of 32 jobs and $300,000 in personal income each year from 1978-1981. The 187.3 MMBF per year harvest yielded $4.2 million in revenues to Lane and Linn counties. These revenues support approximately 100 employees in county government with a payroll of $1.3 million.

The wages and salaries paid to loggers, mill workers, reforestation labor and county employees are circulated through the economy. Eventually, these personal earnings are drawn from the county into statewide or national markets. Table 2-17 also reports the cumulative (direct, indirect and induced) effects on the economy of the study area of harvesting and processing timber from BLM-administered lands. In the two counties, the District's timber sale program supports 4,120 full-time jobs and $74.5 million dollars in local personal income. Overall in western Oregon, the District's timber sale program supports 5,631 jobs and $99 million in personal income.

Data on total employment and earnings, wood products employment and earning and BLM-dependent employment and earnings are displayed in Tables 2-18 and 2-19.

Table 2-16 Average Volume Harvested (1978-1981) Annually on all Ownerships, BLM Lands and BLM Lands Administered by the Eugene District (Millions of Board-Feet Scribner Long Log Scale)

County	Average Total Harvest	Average BLM Harvest All Districts	Percent BLM of Total County Harvest	Average BLM Harvest Eugene District	Percent Eugene District of Total County Harvest
Lane	1,040.7	151.7	14.6	143.5	13.8
Linn	609.6	37.4	16.3	6.9	1.1
Douglas	1,186.6	189.1	15.9	16.3	1.4

Source: Annual Oregon Timber Harvest Reports Prepared by the Oregon State Department of Forestry, Eugene District Planning Area Analysis.

Table 2-17 Average Annual Economic Effects of Timber Management on Lands Administered by the Eugene District (1978-1981)

	Lane-Linn Counties		Western Oregon	
	Jobs [1]	Payroll (millions of dollars)	Jobs [1]	Payroll (millions of dollars)
Timber Harvest & Processing (187.3 MMBF)				
Logging	270	5.0	300	5.6
Sawmills, Veneer & Plywood	937	17.4	937	17.4
Pulp, Paper & Particleboard	187	5.5	187	5.5
Reforestation	32	.3	35	.3
O&C Revenue Disbursement ($4.2 million; Lane & Linn) ($22.7 million; Western Oregon counties)	103	1.3	532	6.9
Economic Effects on Other Business Sectors	2,591	45.0	3,640	63.3
Total Economic Effect	4,120	74.5	5,631	99.0
Effect per MMBF	22	.398	30	.529

[1] All estimates refer to full-time equivalent; e.g., two jobs of 6-months duration equals one full-time equivalent.

Table 2-18 Average Total Employment, Forest Products Employment and Dependent Forest Products Employment (1978-1980)

County	Average Total Employment	Average Forest Products Employment	Percent Forest Products of Total Employment	Forest Products Employment Dependent on BLM Timber from the Eugene District	Percent of Total Employment Dependent on BLM Timber from the Eugene District	Percent of Forest Products Employment Dependent on BLM Timber from the Eugene District
Lane	117,800	14,260	12.1	1,321	1.1	9.3
Linn	34,600	5,580	16.1	75	.2	1.3
Region	152,400	19,840	13.0	1,396	.9	7.0

Source: These total employment figures represent the aggregate of wage and salary employment and proprietor employment averaged for the 3-year period. Wage and salary employment is from Oregon Employment Division, Oregon Department of Human Resources. Proprietor employment in the forest products industry is estimated to be 3.3 percent of the number of non-farm proprietors in the county (see Resource Industries Analysis, p. 27).

Table 2-19 Total Personal Earnings, Personal Earnings in Forest Products and Personal Earnings Dependent on BLM Timber from the Eugene District (1979)

County	Average Total Personal Earnings ($1,000,000)	Average Personal Earnings in Forest Products ($1,000,000)	Percent Forest Products of Total Personal Earnings ($1,000,000)	Personal Earnings in Forest Products Dependent on BLM Timber from Eugene District	Percent of Total Personal Earnings Dependent on BLM Timber from the Eugene District	Percent of Forest Products Personal Earnings Dependent on BLM Timber from the Eugene District
Lane	1,359	270	19.9	25.0	1.8	9.3
Linn	439	103	23.5	1.4	.3	1.4
Region	1,798	373	20.7	26.4	1.5	7.1

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Table 25, April 1982. Personal earnings in forest products are 1979 average earnings per employee in SIC 24 and 26 from Oregon Department of Human Resources (1981) times the estimated number of employees and proprietors in Table 2-18.

The Effect of Timber Harvest on Public Revenue

Receipts from the sale or use of resources found on O&C and public domain lands are distributed to State and local governments through distribution formulas established by Congress and the Oregon legislature. Receipts from the sale of timber on all O&C lands in western Oregon are pooled. Fifty percent of this revenue is distributed among the counties with O&C land in proportion to the 1915 assessed value of the O&C lands in each county. Table 2-20 shows the importance of O&C revenue distribution to individual counties. The summary data

reported highlight principal sources of revenue (as a percent of total) and revenue per capita for Lane County, Linn County and all counties in Oregon. O&C revenues provide 23.2 percent of revenue from all sources for Lane County, 16.0 percent of revenues for Linn County and 24 percent of revenues for all Oregon counties sharing in O&C disbursements. The value of these disbursements to the O&C counties can be equated in terms of property tax equivalents--the amount per $1,000 assessed value which property tax levies would have to be increased to raise an amount of revenue equal to the county's share of O&C receipts (Table 2-21).

A net of 4 percent of revenues from public domain lands is remitted to the State of Oregon. These revenues in Oregon are distributed to counties on the basis of total land areas for the benefit of county roads and bridges. Receipts from the sale of timber on public domain lands in the Eugene District were $35,400 in FY 1980 and $447,800 in FY 1981. These receipts yielded $1,400 to Oregon counties in FY 1980 and $17,900 in FY 1981.

Fishing, Hunting and Other Recreation

The annual direct and indirect economic effects of expenditures made by persons engaged in commercial and sport fishing, hunting and general recreation are listed in Table 2-22. Expenditures dependent on the production of these three resource categories on Eugene District BLM-administered lands generated the equivalent of 122 full-time jobs and $763,000 in local personal income each year.

Table 2-20 Relationship of O&C Receipts to Total County Revenue 1977-1978

County	July 1977 Population	All County Revenues Total	All County Revenues Per Capita	O&C Receipts Per Capita	O&C Receipts as Percent of Total Revenue
O&C Counties					
Douglas	83,700	$47,129,135	$563.07	$317.38	56.4
Curry	14,500	10,413,999	718.20	266.94	37.2
Josephine	50,900	21,336,703	419.18	251.68	60.0
Jackson	118,500	28,163,565	237.67	140.23	59.0
Coos	61,100	13,282,054	217.38	102.40	47.1
Columbia	33,300	5,657,264	169.88	65.60	38.6
Lane	252,500	69,854,471	276.66	64.13	23.2
Polk	42,000	6,675,535	158.94	54.54	34.3
Benton	67,400	10,757,796	159.61	44.21	27.7
Klamath	56,500	15,048,215	266.34	43.92	16.5
Linn	85,000	17,483,769	205.69	32.94	16.0
Tillamook	18,800	9,741,845	518.18	31.59	6.1
Clackamas	211,000	31,918,673	151.27	27.89	18.4
Yamhill	47,200	6,701,979	142.00	16.18	11.4
Lincoln	28,700	8,811,501	307.02	13.30	4.3
Marion	177,700	20,744,224	116.74	8.71	7.5
Washington	200,800	19,864,988	98.94	3.33	3.4
Multnomah	556,400	97 971,907	176.09	2.08	1.2
Total	2,106,000	$441,557,623	$209.67	$50.35	24.0

Source: University of Oregon, Bureau of Governmental Research and Service. The O&C Lands: Statistical Supplement. Eugene, Oregon.

Table 2-21 O&C Revenue Distribution to Counties Expressed as Property Tax Rate Equivalent and as Percent Supplement to Total Levy, Fiscal Years 1977-1980

County	Amount per $1,000 Assessed Value [1]				Percent Supplement to Levy [2]			
	1977	1978	1979	1980	1977	1978	1979	1980
Benton	$3.36	$2.26	$2.03	$2.05	21.9	12.3	12.4	10.5
Clackamas	1.69	1.17	1.01	.90	6.8	5.4	5.5	4.6
Columbia	2.20	1.77	1.86	1.86	15.2	12.7	13.0	11.7
Coos	6.59	5.32	4.81	4.59	30.9	31.9	29.0	25.3
Curry	13.27	9.81	8.38	7.09	120.2	102.1	92.9	109.2
Douglas	14.47	12.44	11.59	11.50	90.0	110.3	103.8	79.5
Jackson	9.78	6.90	5.85	5.51	50.5	39.3	41.2	33.0
Josephine	18.23	11.78	10.04	9.56	119.1	74.4	89.8	63.0
Klamath	2.47	1.85	1.73	1.68	17.3	13.4	13.7	11.7
Lane	3.92	2.91	2.48	2.36	17.1	14.1	13.6	11.6
Lincoln	0.45	0.40	0.33	0.31	3.4	2.5	2.2	1.6
Linn	1.77	1.39	1.37	1.30	9.4	8.2	8.5	7.1
Marion	0.62	0.43	0.39	0.36	2.6	2.0	2.0	1.7
Multnomah	0.13	0.09	0.08	0.08	0.5	0.4	0.4	0.4
Polk	3.91	2.75	2.43	2.41	16.2	13.6	13.1	12.2
Tillamook	1.38	1.14	1.03	0.93	8.2	7.7	6.4	8.7
Washington	0.19	0.13	0.11	0.10	0.8	0.6	0.6	0.5
Yamhill	1.09	0.75	0.67	0.64	4.9	3.7	3.6	3.1
Average	3.01	2.19	2.54	1.81	13.6	10.9	10.9	9.5

[1] Represents county O&C distribution for fiscal year (ending September 30) divided by total assessed value (in thousands) on January 1 of same calendar year.
[2] Represents O&C distribution as percent of total property tax levy for following year, e.g., FY 1977 distribution as percent of 1977-78 levy.

Source: USDI, BLM 1978a. BLM Facts-Oregon and Washington, 1979, 1980; Oregon Dept of Revenue, Oregon Property Tax Statistics, 1978; Oregon Dept. of Revenue, Dick Yates, telephone conversations, April 15, 1980, June 24, 1980; Oregon Department of Revenue, Vinh Ninh, telephone conversation, April 13, 1981.

Table 2-22 Annual Economic Effect of Fishing, Hunting and Other Recreation (1979)

	Lane & Linn Counties	
	Jobs	Payroll
Fisheries	52	$370,000
Hunting	27	$135,000
Other Recreation	43	$258,000
Total	122	$763,000

SOCIAL CONCERNS

The social environment affected by the Eugene SYU's timber management program includes individuals, organizations and communities. It includes the people whose jobs are based on timber harvesting, timber processing and forest management. Most people directly affected live in Lane County, and small portions of southern Linn and northern Douglas counties. The social environment also includes people and their governments in other O&C counties, Oregon and the nation.

Only a very general profile of this social environment can be presented here. It is based primarily on Centaur Associates, Inc. 1979, USDI BLM, 1979b USDI BLM, 1980b, and people's attitudes and opinions as expressed during scoping and analyzed in other BLM timber management EISs for western Oregon.

Social Dimensions of Timber Industry Employment

The social aspects of employment include people's dependence on particular jobs and their availability and accessibility. The extent to which the social environment is potentially affected can be estimated in terms of the numbers of timber industry jobs based on Eugene District harvest levels.

Based on information developed in the economic section, Eugene SYU's timber provides the resource base for approximately 9.3 percent of the forest products employment in Lane County and 1.3 percent in Linn County. This is 1.1 percent of total employment in Lane County and 0.2 percent in Linn County. The actual number of jobs involved is 1,321 in Lane County and 75 in Linn County (Table 2-18).

The places people live are also affected. In Lane County, 30 percent of the population lives in rural areas while only 18 percent of all jobs are located

there. As a result, it is likely that rural areas will be affected by what happens to employment in the Eugene-Springfield metro area.

Public Services

BLM's timber management program in the Eugene District will affect public services in all 18 counties in western Oregon receiving revenue from O&C timber sales receipts. Table 2-21 shows O&C revenues expressed as the property tax rate equivalents for the 18 counties over the years 1977 through 1980. Timber sales from the Eugene District have accounted for about 17.5 percent of the O&C revenues; therefore, this percentage can be used as a measure of the significance of Eugene District timber sales to the 18 counties' budgets.

Attitudes and Opinions

There are individuals and organizations with beliefs about herbicide use, old growth and level of allowable cut. The prevalence of these attitudes has not been measured. Some people favor the use of herbicides as a tool for timber production; others oppose its use for ecological, health and economic reasons. Some people favor preserving old growth for ecological diversity, preservation of wildlife and as a recreational and visual asset. Others favor cutting old growth for short- and long-term economic reasons. Some people favor a high allowable cut level for economic reasons. Others believe that lower allowable cut levels will result in greater forest diversity with a wider variety of recreational and subsistence opportunities and ecological benefits. In the woods, a distinction is drawn between workers in logging and those in forest management activities. There is an impression that unemployed logging and mill workers would not comfortably switch into lower paying forest development jobs during off-seasons or off-years in timber harvest and timber processing. The argument has also been made that reduction or elimination of the use of chemical herbicides will lead to increased opportunities for low paying manual labor and a net increase in total forest based employment.

A statewide survey (Harris 1979) included a question about public preferences for various uses of Federal lands in Oregon. Table 2-23 presents the data for the Willamette Valley sub-area, which does not include metropolitan Portland, and for the entire state.

Table 2-23 Changes Survey Respondents Want to See in the Use of Federal Lands (Percent distribution omitting undecided respondents)

	Oregon			Willamette Valley		
Use	More Use	No Change	Less Use	More Use	No Change	Less Use
Wildlife Habitat	61	30	8	62	31	6
Hiking/Backpacking/ Camping	52	38	8	53	35	10
Wilderness Areas	44	38	16	44	40	14
Off-road vehicles/ Snowmobiles	13	24	60	13	23	61
Timber Production	41	38	19	40	36	22
Hunting/Fishing	51	40	7	52	40	7

Source: Harris 1979.

Community Stability

The O&C Act requires BLM to manage the O&C lands for, among other things, ". . .economic stability of local communities and industries." Some small communities are largely dependent on forest industry employment, and the possibility exists that a major employer in a small community may be highly dependent on timber resources from the Eugene District.

Since BLM timber is sold by competitive bid, various communities will be affected to a different extent in different years. Using data from 1975-77, for an

example, it is possible to identify the types of communities that could be affected in the future, and to show that they would probably be affected differently. Tables 2-24 and 2-25 are included to provide an illustration of the distribution of BLM timber from the Eugene SYUs; they are not intended to suggest that the specific communities mentioned would receive the amount of BLM timber shown in any future years.

Table 2-24 shows the distribution of Eugene District timber to various communities in Lane, Linn and Douglas Counties for the years 1975-77. Mills in the Eugene-Springfield metropolitan area received 41 percent of the Eugene District total, with the remainder going to smaller communities.

Table 2-25 shows the estimates of wood processing jobs in those communities that use Eugene District timber. Wood processing jobs are the only manufacturing jobs in Culp Creek, Mapleton and Noti, and over 75 percent of all manufacturing jobs in Sweet Home, Lebanon and Coburg. Table 2-25 presents information related only to direct employment in wood processing jobs. There are additional jobs in those communities related to timber harvesting and manufacture of wood products.

Table 2-24 [1] Eugene District, BLM Log Flow [2] Average for 1975, 1976 and 1977, in MBF

Destination by County and Town	Siuslaw Sustained Yield Unit		Upper Willamette Sustained Yield Unit		Town Total From the Eugene District
	Noti R.A.	Lorane R.A.	Mohawk R.A.	Lorane R.A.	
Douglas County					
Reedsport	--	843.0	--	--	843.0
Lane County					
Coburg	9,333.0	1,427.0	--	--	10,760.0
Cottage Grove	--	846.0	--	21,805.3	22,651.3
Creswell	--	1,798.0	514.0	--	2,312.0
Culp Creek	4,667.0	2,141.0	--	17,438.3	24,246.3
Cushman	--	1,268.0	--	--	1,268.0
Eugene/Springfield	14,000.0	15,308.0	13,537.3	28,012.7	70,858.0
Junction City	333.0	--	1,180.7	--	1,513.7
Mapleton	1,667.0	2,089.0	--	--	3,756.0
Marcola	--	172.0	--	--	172.0
Noti	3,333.0	1,515.0	1.3	74.3	4,923.6
Vaughn	12,667.0	6,679.0	--	--	19,346.0
Linn County					
Foster	--	891.0	--	--	891.0
Lebanon	--	--	324.0	--	324.0
Sweet Home	--	--	9,141.0	--	9,141.0
Total	46,000.0	34,977.0	24,698.3	67,330.6	173,005.9

[1] Source: Centaur Associates, Inc. 1979, Table III. 1-5
[2] Douglas-fir only, which was over 90 percent of the total harvest for these years.

Table 2-25 Estimates of Significance of Eugene District Timber on Employment in Wood Processing

County and Town (1978 pop.)	Number of Jobs [1] in Wood Processing	MMBF from [2] Eugene Dist.	Number of Processing Jobs Based on Eugene District Timber [3] (Using 6.0/MMBF)	Percent of Processing Jobs Based on Eugene District Timber
Douglas County				
Reedsport (5,250)	172	0.843	5.1	2.9
Lane County				
Coburg (855)	100	10.760	64.6	64.6
Cottage Grove (7,400)	934	22.651	135.9	14.6
Creswell (1,830)	203	2.312	13.9	6.8
Culp Creek	520	24.246	145.5	28.0
Cushman	Data not available			
Eugene/Springfield (145,500)	5,400	70.858	425.1	7.9
Junction City (3,000)	221	1.514	9.1	4.1
Mapleton	510	3.756	22.5	4.4
Marcola	Data not available			
Noti	120	4.923	29.5	24.6
Vaughn	Data not available			
Linn County				
Foster	Data not available			
Lebanon(9,560)	1,903	0.324	1.9	0.1
Sweet Home (7,250)	895	9.141	54.8	6.1
Totals	10,978	151.328	908.0	8.3

[1] Source: State of Oregon, 1978
[2] From Table 2-25
[3] A rounded average for the west-central region, based on 1976 data in Centaur Associates, Inc., 1979, Table IV. 1-1, page 83.

CHAPTER 3 ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

In this chapter, environmental consequences (impacts) are compared to the existing situation as described in Chapter 2. Economic impacts are based on the existing situation plus projections of price and revenue levels under Alternative 6 (No Action). The significant impacts resulting from implementation of the proposed action and each of the alternatives are analyzed in relation to these baselines. A tabular comparison of composite impacts from each alternative is shown in Table 1-3. Analysis, including the scoping process, indicates that timber management would have no significant impacts upon climate, geology, topography, minerals, grazing, agriculture, utilities, communication sites, energy use and wilderness. Therefore, these topics are not discussed.

The major actions which cause impacts are timber harvest, road construction, site preparation (includes slash burning and herbicide use), plantation maintenance and release, plantation protection, precommercial thinning and fertilization. Significant effects to the local area and its economic base can also occur depending upon which alternative and harvest volume levels are ultimately selected. These would include changes in employment, personal income and sharing of sale receipts with county governments, school districts and other local taxing entities.

In analyzing the impacts of the original Proposed Action (Alternative 7), a sample 5-year (1984-1988) timber sale plan (available for review at the Eugene District Office) was developed and used, where applicable, to assess potential site specific timber sale impacts. Although a sample 5-year timber sale plan is used for analysis purposes, actions identified are considered typical for the entire decade, except impacts on scarce wildlife habitats will be greater in the second half of the decade. Possible conflicts identified in this chapter for specific sales will be thoroughly addressed in detailed site specific environmental assessments. Timber management treatments not included in the timber sale plan (planting, vegetation control with herbicides, animal damage control, precommercial thinning and fertilization) are analyzed at the proposed 10-year levels. Site specific environmental assessments will be prepared when specific acreages are identified for each treatment. Analysis of the alternatives is based on the different levels of treatments shown in Table 1-1.

In many cases, existing resource data are limited, and specific sites for proposed timber management activities are not known for the 10-year plan period. As a substitute, "most probable case" and "worst case" assessments are addressed in this chapter.

Two time frames are used in the analysis process. The short term is the first 10 years following the adoption of a new timber management plan. The long term is defined as beyond 10 years. Other time periods pertinent to specific impact discussions are used as necessary and identified in the text.

Analysis of long-term impacts for all alternatives is based on the assumption that the alternatives would be continued for many decades. In fact, the 10-year timber management plan and related land-use allocations selected after completion of the EIS, will be subject to revision at the end of one decade.

A basic assumption of the analysis is that sufficient funding and personnel will be available for implementation of the final decision.

IMPACTS ON AIR QUALITY

During the construction of new roads and maintenance of older roads, fine particulate matter would be disturbed. This dust settles back to earth in relatively short distances, does not adversely impact anyone away from the construction sites and, thus, will not be considered further.

The major impact to air quality in the SYUs would be from slash burning. Estimated levels of burning activity by alternative are given in Table 1-1 (Site Preparation/Broadcast Burning).

Regardless of the alternative selected, all burning would be done in accordance with the Oregon Smoke Management Plan. Normally, smoke would be carried into upper air levels and away from populated areas. Occasionally, unforecasted weather changes will cause some smoke to return to surface areas, causing visible intrusions in nearby residential areas. When slash fires burn or smolder overnight, the cooling nighttime temperatures generally bring residual smoke down valleys which may cause visibility and increased particulate problems. The probability of intrusion would be highest under Alternative 1, due to more acres burned, and lowest under Alternative 10. Past experience indicates that visible intrusions may affect the population centers of Eugene-Springfield and Roseburg. Reported smoke intrusions from BLM Eugene District slash burns affected the area around Eugene in 1981 (OSDF 1982). Between 1977 and 1981 Eugene BLM was responsible for 11 of the 37 (30 percent) reported smoke intrusions in Lane County.

Smoke intrusions are becoming less frequent as more burning is done in the spring and summer, and better weather forecasts are made. Sufficent data does not exist to allow a statistically correct projection of expected problems over the next decade.

Airborne particles less than 1.0 microns in diameter make up 80 percent of smoke particulates. Particles of this size have very low fall velocities, about 5 cm/hour, and therefore travel distances of approximately 100 miles. Particles of this size also scatter visible light (0.3 microns blue to 0.8 microns red) which cause visability intrusions.

Depending on the wind direction and speed following slash fires, visibility intrusions can be expected to occur in the Eugene-Springfield AQMA, the Roseburg AQMA, or the Class I areas of Kalmiopsis, Mt. Washington, Three Sisters, Mt. Jefferson, Diamond Peak or Mt. Hood Wilderness Areas (Personal communication Dr.s Deeming and Sandberg 1982).

The wood component of slash is made up of about 50 percent carbon, 6 percent hydrogen, 43 percent oxygen and small amounts of nitrogen and other elements. When burning occurs, temperatures of 570° *F to 2550°* F are maintained (Hall 1972) which produce carbon dioxide (CO_2) and water vapor. The whitish column of smoke observed from controlled slash fires is made up of over 90 percent water vapor and CO (Table 3-1).

The contaminants most frequently found in slash smoke are carbon dioxide (CO_2), carbon monoxide (CO), nitrous oxides (NO_x), hydrocarbons (HC) and respirable fine particulates (Sandberg et al. 1978).

Table 3-1 Average Emission Components From Slash Burning (Tons/Decade)

	Alternative									
	*1 Max./EFD	2 Max. Tbr.	3 Def Har.	4 S.S.D.	5 E-W Cor.	6 No Action	7 O.P.A.	8 No Herb.	9 Eco.	10 Full Eco.
Tons of Slash Burned	803,495	775,325	759,917	739,409	724,512	650,675	681,926	607,099	403,522	294,480
Particulates [1]	16,873	16,282	15,958	15,528	15,215	13,664	14,320	12,749	8,474	6,184
Hydrocarbons [2]	10,044	9,692	9,499	9,243	9,056	8,133	8,524	7,589	5,044	3,681
Carbon Monoxide	104,454	100,792	98,789	96,123	94,187	84,588	88,650	78,923	52,458	38,282
Sulfur Oxides [3]	---------- Negligible ----------									
Nitrous Oxides [4]	1,607	1,551	1,520	1,479	1,449	1,301	1,364	1,214	807	589
Water Vapor and Carbon Dioxide [5]	------ Greater than 90 percent of the Mass of Combustion Products ----------									
Total	132,978	128,317	125,766	122,372	119,907	107,687	112,859	100,475	66,783	48,736

[1] Particulates are near 0.1 micrometer in diameter. Average emission of 17-67 pounds/ton slash burned.
[2] Hydrocarbons are a diverse class of compounds containing hydrogen, carbon and oxygen.
[3] Sulfur oxides (SOx) are produced in small quantities, since most forest residues contain less than 0.2 percent sulfur.
[4] Nitrous oxides (NOx) are found in some very hot fires, but is probably not a problem. The temperature required to fix atmospheric nitrogen is over 2800°F and these temperatures are not easily attained in slash burns.
[5] Carbon Dioxide (CO_2) is not an air pollutant in the usual sense. About 1 ton of burned fuel produces 1 to 1 1/2 tons of CO_2 (Ryan et al. 1976 **Cited in** Sandberg et al. 1978).

Source: J. Alfred Hall 1972 and Sandberg et al. 1978

Conclusions

The major impact to air quality would be visible smoke from slash burning. Smoke from the Eugene SYUs would not likely impact the Class I Wilderness areas.

IMPACTS ON SOILS

The major impacts of timber management on soils are compaction, landsliding, topsoil erosion and depletion of organic matter, nitrogen and other nutrients. Each results in a loss of soil productivity (see Glossary). Timber management activities include road, fire trail and landing construction and yarding logs. Scarification and slash burning are cause agents. The amount of landslides and surface erosion is influenced by the steepness of slopes, soil properties, amount of disturbance and remaining litter cover, and the amount and intensity of precipitation (Pritchett 1979).

Standard design features would be employed to minimize adverse impacts on soils. Compacted soils from tractor logging in clearcut units would be ripped or tilled to partially restore productivity. Loss of productivity due to compaction from tractor logging in partial cut units cannot be mitigated during the rest of the rotation. Partial and total suspension yarding systems would be used to minimize soil disturbance. New roads would be located away from streams and on ridgetops and designed to avoid undercutting or overloading unstable slopes. Excess road material on unstable and potentially unstable slopes would be end-hauled to reduce landsliding. Scarification would be done during dry soil conditions without piling soil. Slash burning and scarification would be minimized on thin, droughty or nitrogen-deficient soils.

Table 3-2 shows estimated acres upon which soil productivity would be lost as a result of timber management during the first decade under the proposed action and alternatives.

Soil compaction results primarily from the weight and shearing forces involved in dragging logs and operating ground-based logging equipment. Compaction hinders root penetration and water percolation and availability, reducing vegetation growth. Decreases in root penetration of 35 to 65 percent can reduce the vegetative productivity of soils by 10 to 25 percent (Power 1981a). In the Eugene District, tractor logging has been found to reduce soil productivity for the entire cutting unit by 11.8 percent due to compaction (Wert and Thomas 1981). Yarding systems using ground-based equipment have a greater adverse impact on soils than cable systems which drag the logs. One end suspension has a lesser impact than systems providing no suspension. Systems using total suspension have the least impact on soils. Compaction and reduced infiltration capacity have been found to last at least 55 years (Power 1974 **Cited in** Fredriksen and Harr 1979) and therefore may last longer than harvest rotation periods.

Site scarification and slash piling by tractors with brush rakes compacts soils and displaces topsoil. This practice can be expected to reduce soil productivity by 11 to 22 percent (Clutter and Dell 1978). One study in the Salem District showed a reduction of 17 percent in productivity after scarification (Power 1981b). Topsoil is also removed by dragging logs and by constructing fire trails, roads and landings with heavy equipment.

Table 3-2 Estimated Loss of Productivity During First Decade (acres) [1]

Process	Alt.1 EFD	Alt.2 Max. Tbr.	Alt.3 Def. Har.	Alt.4 S.S.D.	Alt.5 E-W Cor.	Alt.6 No Action	Alt.7 O.P.A.	Alt.8 No Herb.	Alt.9 Eco.	Alt.10 Full Eco.
Road Construction [2]	2,107	2,107	2,031	2,015	1,921	2,002	2,031	2,031	2,103	1,626
Yarding Systems (Compaction) [3]	2,353	2,271	2,226	2,226	2,125	2,010	2,003	1,784	1,201	860
Landsliding	10	9	9	9	9	8	9	8	6	5
Dry Ravelling	Acreage data unavailable									
Nutrient Depletion	Acreage data unavailable (see Table 3-4)									
Totals	4,470	4,387	4,266	4,250	4,055	4,020	4,043	3,823	3,310	2,491

[1] Productivity loss of commercial timber resulting from road construction and landslides is long term. Loss from compaction has been estimated to last at least 55 years.
[2] From Table 1-2.
[3] These are equivalent net acres (acres compacted x percent loss of productivity due to compaction).

Landslides (debris avalanches) in the form of rapid, shallow soil mass movements down hillslopes appear to be increased by timber harvesting activities. Road building results in an increase of occurrence of debris avalanching ranging from 25 to 340 times, and clearcutting by 2 to 4 times (Swanston 1976). Areas prone to slides are typified by shallow, noncohesive soils on steep slopes where subsurface water may be concentrated (i.e., road ditches) and where natural drainages have spacing of 400 feet or less (Gresswell et al. 1979). Soils such as Bohannon, Preacher, Digger or Jason can be expected to landslide when harvested of trees on steep slopes, or when roads are constructed across them. Most failures can be expected at or near headwalls; however, the district will continue to attempt leaving trees and vegetation at headwall areas in unstable terrain within sale units, thereby protecting the soil from landsliding. The removal of excess material during roadbuilding (end-hauling) is presently a district practice, and district experience with this method indicates less failures of roads than when debris was side-cast. Estimates of landslides considering such practices are presented in Table 3-3.

Material from debris avalanches usually scour stream channels to bedrock, ending in debris dams (Hughes and Edwards 1978).

Dry ravelling in disturbed areas takes place throughout the year in the SYUs and results in loss of topsoil and decreased soil depth. When vegetation and duff are removed by yarding logs, slash burning or other practices, surface soil is free to move and ravelling is accelerated. On steep, south-facing slopes ravelling may continue up to 10 years after disturbance or until vegetation becomes reestablished.

Table 3-3 Estimated Landslide Erosion in Tons/Decade by Alternative

Alternative	Roads	Clearcuts	Totals
1	64,032	33,830	97,862
2	64,032	32,643	96,675
3	61,658	31,995	93,653
4	61,327	31,140	92,467
5	58,291	30,505	88,796
6	60,720	27,396	88,116
7	61,658	28,712	90,370
8	61,658	25,508	87,166
9	63,756	16,990	80,746
10	49,183	12,399	61,582

Nitrogen in forest soils is formed in organic matter and humus layers. Nitrogen and other nutrient losses from the forest ecosystem is dependent on the intensity of the fire. Cromack (1979) showed losses of about 600 pounds per acre in old-growth Douglas-fir at the H.J. Andrews Expermintal Forest. An average burn on the Eugene District is estimated to remove nearly 500 pounds per acre from an old-growth stand.

Standard mitigating measures minimize soil fertility loss by fire. Cool spring burns that volitilize few nutrients are prescribed on a priority basis. (Table 3-4 shows nitrogen losses.)

Table 3-4 Nitrogen Losses Caused by Mild Burning (Tons/Decade)

Alternative	Nitrogen
1	10,895
2	10,513
3	10,304
4	10,029
5	9,825
6	8,823
7	8,761
8	8,215
9	5,472
10	3,993

Conclusions

Impacts to soil and soil productivity are mainly due to road construction, landslides, and compaction. Alternative 1 has the greatest impacts on long-and short-term losses while Alternative 10 has the least. Acres lost from production range from 2,491 under Alternative 10 to 4,471 under Alternative 1. Less significant impacts include nutrient losses, dry ravelling and top soil removal.

IMPACTS ON WATER RESOURCES

Forest management activities which would impact water resources include road building, timber harvest, slash burning and application of fertilizers and herbicides. These activities can affect water yields, seasonal streamflow characteristics (peaks and low flows) and instream water quality (sedimentation, temperature, dissolved oxygen, nutrients and organic substances). The significance of each impact would depend upon the amount of timber harvested in each watershed, the proximity of the activities to streams and the site-specific application of mitigating measures.

Water Quantity

Forest harvest activities would have very little effect on the streamflow of larger rivers draining the SYUs. Table 3-5 shows estimates of annual water yield from public lands in the SYUs for each alternative, compared to the existing yield and undisturbed watershed.

Although the effect of timber harvest on streamflow in the larger rivers would be small, local short-term increases in water yield would occur in clearcut areas. Removing forest vegetation reduces evapo-transpiration (see Glossary), thereby increasing the amount of rainfall available for streamflow. Studies of clearcutting small watersheds in western Oregon showed that water yields from clearcut areas increased 26 to 43 percent following harvest (Harris 1977; Rothacher 1970; Harr et al. 1979). Based on Rothacher's (1970) study of clearcutting in the central Oregon Cascades, water yield from clearcut areas in the SYUs is expected to increase 35 percent. The duration of increased water yields is not easily predicted; however, varying degrees of altered yields may last up to 35 years (Kovner 1956, **Cited In** Harr et al. 1979). Compacted soils and roads are permanent sources of water yield increase.

In addition to altering total annual water yields, timber harvest would affect the timing and magnitude of seasonal streamflows in small watersheds in the SYUs. Rothacher's (1970, 1973) study of small watersheds near the SYUs showed fall and spring peak flows were increased by logging, although extreme winter peaks were relatively unaffected. A recent analysis (Christener 1981) suggests that extreme winter peaks may also be increased by timber harvest if the peaks occur from heavy rainfall on an existing snowpack. Summer low-flow levels would also be increased by timber harvest. Studies of other small watersheds in the central Oregon Cascades (Rothacher 1971) suggest minimum flows for small watersheds in the SYUs would increase up to 300 percent. Although relative changes in minimum flows may be large (200 to 300 percent), absolute changes would be small, due to naturally low levels of streamflow during the summer months (Ibid.). Increases in peak and low flows would be greatest in small watersheds sustaining the greatest increases in clearcut acreages during the next decade.

Water Quality

Timber harvesting, road building and slash burning would increase sediment discharge from affected small watersheds in the SYUs. Fredriksen and Harr (1979) reported that logging in the central Oregon Cascades increased suspended sediment yield 23 times the natural rate (undisturbed condition) in a patch cut watershed with roads, and nine times the natural rate in a clearcut watershed without roads. Hughes and Edwards (1978) reported that sluice-outs from intermittent streams in clearcuts were eight times as large (on a per acre basis) as from intermittent streams in undisturbed watersheds, and most (85 percent) resulted from headwall failure. These sluice-outs originated during storms which occur every 5 to 12 years. Similar increases in sediment yield can be expected in small watersheds within the SYUs where mass soil movement (debris avalanching) is the dominant erosion process (see Impacts on Soils). In undisturbed watersheds,

Table 3-5 Estimated Annual Water Yield by Watershed, End of First Decade

Watershed		Alt. 1 Max./EFD	Alt. 2 Max. Tbr.	Alt. 3 Def. Har.	Alt. 4 S.S.D.	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
01	Acres Clearcut	2,141	2,066	2,025	1,971	1,931	1,734	1,817	1,614	1,075	785
Middle Fork	Water Yield	2,987,429	2,987,169	2,987,026	2,986,839	2,986,700	2,986,017	2,986,305	2,985,601	2,983,730	2,982,742
Willamette	Percent Increase	0.24	0.24	0.24	0.23	0.22	0.20	0.21	0.19	0.13	0.09
02	Acres Clearcut	11,479	11,077	10,857	10,566	10,351	9,296	9,742	8,655	5,765	4,207
Coast Fork	Water Yield	1,244,863	1,243,677	1,243,028	1,246,170	1,241,535	1,238,343	1,239,739	1,236,532	1,228,007	1,223,411
Willamette	Percent Increase	2.80	2.70	2.64	2.57	2.52	2.26	2.37	2.11	1.40	1.02
03	Acres Clearcut	6,107	5,893	5,776	5,622	5,507	4,946	5,183	4,605	3,067	2,238
Upper Willamette	Water Yield	9,016,099	9,015,220	9,014,739	9,014,106	9,013,633	9,011,238	9,012,302	9,009,926	9,003,605	9,000,198
	Percent Increase	0.28	0.27	0.26	0.26	0.25	0.23	0.24	0.21	0.14	0.10
04	Acres Clearcut	7,832	7,558	7,407	7,209	7,062	6,342	6,647	5,905	3,933	2,870
McKenzie	Water Yield	4,360,943	4,359,545	4,358,775	4,357,766	4,357,016	4,353,344	4,354,400	4,351,115	4,341,058	4,335,637
	Percent Increase	0.92	0.89	0.87	0.85	0.83	0.75	0.78	0.70	0.46	0.34
06	Acres Clearcut	0	0	0	0	0	0	0	0	0	0
South Santiam	Water Yield	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000	2,137,000
	Percent Increase	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
205	Acres Clearcut	257	248	243	236	232	208	218	194	129	94
Alsea	Water Yield	1,135,364	1,135,316	1,135,290	1,135,253	1,135,232	1,135,105	1,135,158	1,135,030	1,134,685	1,134,499
	Percent Increase	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.09	0.06	0.04
206	Acres Clearcut	15,778	15,225	14,922	14,523	14,227	12,777	13,391	11,897	7,924	5,783
Siuslaw	Water Yield	1,870,261	1,867,623	1,866,177	1,864,274	1,862,862	1,855,946	1,858,875	1,851,748	1,832,879	1,822,585
	Percent Increase	4.20	4.05	3.97	3.86	3.78	3.40	3.56	3.16	2.11	1.54
303	Acres Clearcut	1,244	1,200	1,176	1,145	1,121	1,007	1,055	938	625	456
Umpqua	Water Yield	5,486,899	5,486,796	5,486,740	5,486,667	5,486,612	5,486,346	5,486,458	5,486,185	5,485,456	5,485,062
	Percent Increase	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.02
Totals											
Water Yield		28,238,858	28,232,346	28,228,775	28,228,057	28,220,590	28,203,399	28,210,237	28,193,137	28,146,428	28,121,098
Percent Increase		0.66	0.64	0.62	0.62	0.60	0.54	0.56	0.50	0.33	0.24

streams are usually capable of transporting more sediment than is delivered to them (Rice et al. 1979). During and following timber harvest, road construction and slash burning, sediment and debris would be delivered to drainage systems. Sediment discharge would then no longer be determined by the availability of sediments, but by the transporting ability of streams. Increased water yields (Table 3-5) would also increase the ability of streams to transport sediments. Where stream energy is insufficient to transport all the sediment, deposition would occur. Estimated sediments from timber management on BLM-administered lands are shown in Table 3-6.

Surface vegetation left undisturbed in areas bordering streams can act as a filter and retain soil particles eroded from the surface of disturbed areas, thereby reducing suspended sediments in streams. The effectiveness of sediment buffers is dependent upon slope, type and density of vegetation, duff layer and buffer width. When water temperature is not a concern and careful planning is used in partial cutting of buffers (falling timber away from streams, no tractor harvest and no burning), the removal of merchantable timber may not adversely affect the sediment trapping ability of the buffer (Froehlich 1982, personal communication). Buffers would protect third order and larger streams in Alternatives 3, 4, 5, 7 and 8, and protect all streams in Alternatives 9 and 10. Vegetative buffers along first and second order streams would be provided as necessary to minimize impacts on water quality in Alternatives 3, 4, 5, 7 and 8. No buffers are planned in Alternatives 1, 2 and 6. When buffers are left on third order and larger streams, sediment produced from first and second order streams will enter at the headwaters and be carried down the drainage system whenever stream energy is sufficient for transport.

The chemical quality of surface water would be affected by slash disposal by broadcast burning. In one Oregon Cascades watershed studied by Fredriksen (1971), instream concentrations of ammonia-nitrogen and manganese reached peak levels of 7.6 and 0.44 parts per million (ppm), respectively, when runoff from rainfall that extinguished the burn entered the stream. In the SYUs, only Alternatives 9 and 10 would provide full protection for streams. Ammonia-nitrogen and manganese concentrations could exceed recommended water quality standards (0.02 ppm for free ammonia-nitrogen, 0.05 for manganese) in some first and second order streams for several days following slash burning. However, water from these streams would quickly be diluted upon entering third order or larger streams. Impacts to water quality are not significant.

Table 3-6 Estimated Increased [1] Sediment from Timber Management Activities on BLM-Administered Land, End of First Decade (Tons/Decade)

Alternative	Landslides [2]	Raveling	Roads	Total
1.(Max./EFD)	73,396	31,611	3,831	108,838
2.(Max. Tbr.)	72,506	30,503	3,831	106,840
3.(Def. Har.)	70,240	20,927	3,686	94,853
4.(S.S.D.)	69,350	20,368	3,666	93,943
5.(E-W Cor.)	66,597	19,953	3,485	90,035
6.(No Action)	66,087	25,598	3,630	95,315
7.(O.P.A.)	67,778	18,780	3,686	90,244
8.(No Herb.)	65,337	16,684	3,686	85,707
9.(Eco.)	60,560	0	3,812	64,372
10.(Full Eco.)	46,187	0	2,940	49,127

[1] Sedimentation increase treats only new roads, landslides and raveling.
[2] Assumes 75 percent of landslide material from Table 3-3 becomes sediment.

Due to insignificant surface runoff in areas to be fertilized, substantial increases in nutrient concentrations in streams following forest fertilization are not expected in the SYUs. Pelleted urea dissolves slowly and is utilized by vegetation before it can be translocated.

Timber harvest affects stream temperatures by removing shading vegetation from streambanks. Stream temperature increases of 10° F or more have been recorded following removal of streamside vegetation by clearcutting and burning in both the Oregon Cascades and Coast Range (Brown and Krygier 1970; Levno and Rothacher 1969). Alternatives 9 and 10 provide temperature maintenance for first order and larger streams. Under Alternatives 1, 2 and 6 removal of merchantable timber would reduce the effectiveness of buffers to provide adequate shade resulting in increased temperatures. Downstream shading does not significantly lower temperatures of streams warmed by upstream exposure (Brown et al. 1971).

The effects of herbicide application on water quality have been described elsewhere (USDI, BLM 1978). Design elements (see Chapter 1) such as buffer strips are expected to minimize herbicide drift or accidental direct spraying of water bodies. Amounts of herbicide reaching streams beyond these barriers would be insignificant and would not adversely affect water quality. Movement of herbicides through the soil (leaching) is usually measured in terms of inches or a few feet (Norris 1975). This is a slow process that would not lead to stream contamination, because the herbicide would degrade before reaching free water (Ibid.). For additional discussion, see Chapter 3, Impacts on Animals and Impacts on Human Health.

Conclusions

Timber harvest would have a very little effect on water yield in the larger rivers and streams. Sedimentation would be expected to be greatest under Alternative 1 and least under Alternative 10. Increased stream temperatures can be expected in Alternatives 1, 2 and 6. Overall impacts are greatest in Alternative 1 and least in Alternative 10.

IMPACTS ON VEGETATION

This section describes the impacts of implementing a timber management plan on vegetation. All impacts to wetland and aquatic vegetation are expected to be insignificant for all alternatives except 1 and 2. Under Alternatives 1 and 2, wetlands would be significantly impacted by harvesting operations. This would be inconsistent with Executive Orders 11988 and 11990. Aquatic vegetation would be protected only to the degree afforded streams under the Oregon Forest Practices Act.

Terrestrial Vegetation

Management treatments applied under each alternative would impact the existing vegetation in direct relation to the level of treatment shown in Table 1-1. Impacts to riparian habitat are expected to be insignificant under Alternatives 9 and 10 (over 35,000 acres protected). However under Alternatives 1 and 2, riparian habitat would be included in adjacent areas scheduled for final harvest and subsequent management treatments. Alternative 6

would provide protection for 295 acres along third order and larger streams. Alternatives 3, 4, 5, 7 and 8 would protect 8,805 acres of riparian habitat each. Areas adjacent to first and second order streams would be harvested under all alternatives except 9 and 10. The resulting impact would be alteration of the riparian habitat in and around those areas where harvesting operations would occur. The degree of impact would range from removal of the old growth component where individual trees are removed to severe alterations where clearcutting occurs.

Timber harvesting initiates secondary plant succession by overstory removal, creating openings in the forest canopy similar to those created by natural disturbances. Different cutting practices (i.e., clearcutting and single tree selection methods) open the canopy to varying degrees, thereby influencing the plant composition and duration of the plant communities differently.

Clearcutting completely removes the forest canopy, thereby allowing the establishment of the first successional stage (grass/forb). Openings in the canopy created by commercial thinning, and to a lesser extent mortality salvage, could result in insignificant growth increases of understory vegetation.

Vegetation composition in the SYUs would change according to the level of harvest proposed under each alternative. When compared to the existing forest profile, this change is notable by a shift of acreage from one age class to another (i.e., old growth to non-stocked or 0-7 year age group). This acreage shift is best shown by a percent change in individual age class stratification as shown in Tables 3-7 and 3-7B. Long-term effects (1st, 2nd, 5th and 10th decades) were projected and are displayed in Appendices D and E.

The full scope of potential benefits that might accrue from old growth retention is yet unknown. Maintaining a representative structural component of old growth Douglas-fir across a range of environmental variables until these processes are better understood may be essential to maintaining the long-term productivity of timber stands.

Management criteria (Appendix B) utilized to identify large block areas indicate that 15 areas currently exist at the seed zones and elevations listed in Table 3-8. The number of large block areas which would remain intact over the short- and long-term are shown for each alternative.

Yarding practices to be employed during the 10-year period consist of ground or partial suspension cable systems, cable with full suspension and tractor systems. Each system impacts ground vegetation to different degrees relative to the soil disturbance resulting from the harvest system used.

Broadcast burning is the primary method of slash disposal proposed under each alternative. The short and long-term effects of burning are relative to the severity of the burn. According to research in the Coast Range of western Oregon (Morris 1970), 5.8 percent of the total area burned was severely burned. While 16.6 percent of the area remained unburned, 22.2 percent and 55.4 percent received moderate and light burns, respectively. The lighter burn provides a greater percent of herbaceous and brush cover within the first 2 years after burning. Scheduled replanting of coniferous seedlings in the area would contribute to the alteration as a fire-induced plant community became established.

Coniferous seedlings raised in nurseries would be planted (Table 1-1). Under the best possible site conditions, rapid natural regeneration could occur every 3 to 7 years depending on seed crops. Under artificial regeneration, seedlings are generally planted the first year following harvest. Planting stock is grown to specific size standards to allow it to have a competitive advantage in relation to moisture regime and vegetative condition existing on the site. Therefore, planting shortens the amount of time required for succession to progress beyond the grass/forb and shrub/seedling stages. The major long-term impact associated with planting is that, by increasing the competitive advantage of Douglas-fir, early successional stages are more quickly passed through, and Douglas-fir attains site dominance more rapidly. This acceleration not only reduces the residence time of early successional stages but also precludes the development of maximum plant diversity. Planting an estimated 15,500 acres with genetically improved trees during the 10-year period would not have a significant effect on the natural gene pool in either the short- or long-term. No significant adverse long-term impacts are anticipated with the eventual planting of genetically improved trees on 90 percent of the intensive timber production base for each alternative. Maintaining a broad selection of parent trees would ensure variability in genetic base populations. The artificial regeneration program on BLM-administered lands is not expected to significantly affect the stand or species composition of the entire Eugene Area. (Compare Appendices D and E.)

Herbicides are used to manipulate the species composition, size, density, vigor and presence of vegetation. Plant habitat altered by herbicides would increase over that in the past decade in all alternatives except 8, 9 and 10. Applications are targeted to control grass and broadleaf species to provide a competitive advantage for conifers. Different herbicides work best for selected target species and herbicides are often used in combinations. In forestry applications, the desired effect is acceleration of plant succession from early successional stages to later stages dominated by conifers. Gratkowski and Lauterback (1974) reported on the height growth of young Douglas-fir for a 5-year period after release. Percentage increase in

Table 3-7A Approximate Acres of BLM-Administered Timber Lands and Percent of Change After One Decade (1979-1988)

Habitat Age	Current Acres	Alt. 1 Max./EFD	Alt. 2 Max. Tbr.	Alt. 3 Def. Har.	Alt. 4 S.S.D.	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Grass/Forb Non-stocked and 0-7 years	34,270	38,456 +12%	37,041 +8%	36,336 +6%	35,330 +3%	34,656 +1%	27,366 -20%	30,683 -10%	28,569 -17%	18,567 -46%	13,322 -61%
Brush/Seedling 8-15 years	30,112	38,542 +28%	38,385 +27%	38,307 +27%	38,195 +27%	38,120 +27%	43,020 +43%	39,605 +32%	37,473 +24%	36,310 +21%	35,750 +19%
Pole/Sapling 16-45 years	109,511	105,367 -4%	105,367 -4%	105,367 -4%	105,367 -4%	105,367 -4%	115,902 +6%	105,367 -4%	105,367 -4%	105,367 -4%	105,367 -4%
Young 2nd Growth 46-115 years	59,125	78,848 +33%	79,056 +34%	79,153 +34%	79,290 +34%	79,398 +34%	92,391 +56%	79,720 +35%	80,288 +36%	81,503 +38%	78,804 +33%
Mature 116-195 years	26,426	19,017 -28%	19,616 -26%	19,918 -25%	20,297 -23%	20,739 -22%	14,013 -47%	21,605 -18%	23,167 -12%	28,571 +8%	24,570 -7%
Old Growth 196+ years	48,425	25,529 -47%	26,294 -46%	26,755 -45%	27,372 -43%	27,664 -43%	0 -100%	28,853 -40%	30,939 +36%	35,640 -26%	48,425 0%

3-7B[1] Approximate Acres of BLM-Administered Timber Lands and Percent of Change After Two Decades (1989-1998)[1]

Habitat Age	Current Acres	Alt. 1 Max./EFD	Alt. 2 Max. Tbr.	Alt. 3 Def. Har.	Alt. 4 S.S.D.	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Grass/Forb Non-stocked and 0-7 years	34,270	35,444 +3%	33,079 -3%	32,026 -7%	32,387 -5%	31,958 -7%	29,612 -14%	30,693 -10%	24,638 -28%	22,886 -33%	13,145 -62%
Brush/Seedling 8-15 years	30,112	42,393 +41%	40,716 +35%	39,894 +32%	38,928 +29%	38,204 +27%	34,768 +15%	36,176 +20%	31,365 +4%	21,108 -30%	14,781 -51%
Pole/Sapling 16-45 years	109,511	107,255 -2%	107,098 -2%	107,020 -2%	106,908 -2%	106,833 -2%	118,513 +8%	108,318 -1%	106,186 -3%	105,023 -4%	104,463 -5%
Young 2nd Growth 46-115 years	59,125	109,041 +84%	111,330 +88%	111,216 +88%	109,212 +85%	108,147 +83%	109,799 +86%	101,757 +72%	113,200 +91%	98,876 +67%	98,496 +67%
Mature 116-195 years	26,426	3,815 -86%	5,725 -78%	5,669 -79%	4,458 -83%	6,370 -76%	0 -100%	9,485 -64%	11,040 -58%	25,406 -4%	23,215 -12%
Old Growth 196+ years	48,425	5,701 -88%	5,701 -88%	7,979 -84%	11,940 -75%	12,508 -74%	0 -100%	17,371 -64%	17,371 -64%	30,550 -37%	50,508 +4%

[1] At the end of the 10-year proposal period (approximately 1993) the acreage distribution would lie near the mid point of the 2nd decade.

Note: These columns will not have the same total acres due to the differences in the land use allocations of each alternative. This is especially true for Alternative 6 which also utilizes the 1972 land base and inventory.
Source: BLM allowable cut printout and district inventory.

Table 3-8 Large Block Areas Protected by Alternative for Seral Stage Preservation

Seed/Elevation Zone/Interval	Existing Situation	Alt. 1 Max./EFD	Alt. 2 Max.Tbr.	Alt. 3 Def.Har.	Alt. 4 S.S.D.[1]	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
062/1,000-1,500	4	0	0	0	1	2	0	4	4	4	4
252/500-1,000	3	0	0	0	1	1	0	2	2	2	3
252/1,000-1,500	4	0	0	0	1	1	0	1	1	3	4
252/1,500-2,000	1	0	0	0	1	0	0	0	0	0	0
481/1,500-2,000	1	0	0	0	1	0	0	1	1	1	1
481/2,000-2,500	1	0	0	0	1	1	0	1	1	1	1
481/2,500-3,000	1	0	0	0	1	1	0	1	1	1	1

[1] All Western Oregon Districts (BLM) have met to determine which large block areas would be preserved in each District, minimizing duplication. Alternative 4 (S.S.D.) represents the portion which would be protected in the Eugene SYUs (also see Appendix B).

height growth over non-released trees varied from 130 percent (for trees 1 foot high when spraying occurred) to 149 percent (for trees 6 feet high) for basal spray plots and from 255 percent (for trees 1 foot high) to 171 percent (for trees 6 feet high) for aerial spray locations.

Non-target vegetation immediately adjacent to spray units may be affected by the movement of herbicides through the air. Such impacts are limited, but not eliminated entirely, by buffer strips and by application techniques (Gratkowski 1974). Although the direct vegetational impacts of herbicide application are short term, the effects of accelerating the establishment of conifer stands are long term. Once the coniferous stands become dominant they remain until the trees are harvested or until natural disasters remove them. For greater detail on herbicides and the provisions for monitoring of herbicide application, see the FEIS Vegetation Management with Herbicides: Western Oregon - 1978 through 1987 (USDI, BLM 1978).

Some timber stands would be fertilized under all alternatives. This practice would result in immediate increases of nutrient availability for all vegetation on the site. However, resultant increased vigor and growth are directed at commercial conifer species. These are short-term impacts lasting for an average of 7 years, depending on site quality.

Threatened or Endangered Plants

Unidentified threatened or endangered plant species could be susceptible to any impacts described under terrestrial vegetation. Under worst case conditions, the direct effects of injury or death to the plants could cause the immediate elimination of a species in all or a significant portion of its range. The more subtle effects of vegetative community changes could cause the eventual elimination of a species locally through loss of competitive ability relative to other vegetation on the site.

If any species of vascular plant is determined to be threatened or endangered by the U.S. Fish and Wildlife Service, any action that contributes to its extinction or to its threatened or endangered status would be in violation of the Endangered Species Act of 1973 as amended. Therefore, environmental analysis accomplished prior to any site specific action, would identify any threatened or endangered plant species known to be present on the site and appropriate measures to be taken to protect the species.

Conclusions

Alterations to plant community structure diversity and longevity would be the most significant impacts to terrestrial vegetation on those lands included in the timber production base. Continued timber management would not allow natural succession to replace these communities because future forests would be harvested before they reached the 90-year age class.

Ecosystem management assumes that every component of a naturally functioning system serves a purpose and that each component benefits the system. At the present time, there is no definitive description of the functioning of the old growth system and its importance to long-range timber production.

The symbiotic relationships between plants and animals that function in old growth stands are not fully understood and may prove to be important to long-term timber production. Until this is better understood, maintaining a representative range of the old growth forest and associated floral and faunal genotypes may be important. Alternatives 1, 2, 3 and 6 would not meet the criteria to provide an adequate representation of the original old growth systems over the short or long-term. The remaining alternatives (Alternatives 4, 5, 7, 8, 9 and 10) would provide adequate representation during the short term. In the worst case, research during the proposal period could indicate that a larger representation (15 percent or more of the forest land base) of original old growth systems is critical to long-term timber production. Given this situation, only Alternatives 9 and 10 would provide opportunities for adequate old growth preservation.

The short-term use of the commercial forest lands for timber harvest would increase the long-term production of wood fiber as old, slow-growing stands are replaced by young, fast-growing stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes in the intensive timber base, maximum growth of commercial coniferous species is achieved. Intensive timber management practices such as planting and herbicide application would favor survival of coniferous trees and discriminate against hardwood trees, shrubs and herbaceous vegetation. However, elimination of hardwood trees, shrubs and herbaceous vegetation would not occur.

Existing older forest communities scheduled for final harvest would be converted to early successional stage communities. This impact is unavoidable. Table 3-7 indicates the amount of old growth habitat that would be irretrievably lost as long as those acres are managed intensively for timber production under all alternatives. Permanent new road construction ranging from 1,626 acres in Alternative 10 to 2,107 acres under Alternative 1 would result in the unavoidable elimination of vegetation on these acres.

IMPACTS ON ANIMALS

Timber operations impact both animals and their habitats. The greatest impacts are long term and in most cases, occur on animal habitats, rather than to individual animals. Thomas (1979), Meslow (1977) and Wight (1974) have shown that certain species of vertebrates are associated with forests that are of a particular age class and resulting structure. Some species habitat requirements are rigid, others are more flexible.

Combining field investigations with principles of island biogeography (Harris et al. 1982) demonstrated the dependence of 36 species of wildlife, on old-growth forests as primary habitat. The significance of primary habitat, according to Harris, is that "Although some of these species may use the short-rotation forests as secondary habitat, they require that older-aged stands, or specific patches of primary habitat be maintained within the short rotation forest."

The predicted structure of habitat on BLM-administered forest lands (Appendix E) was calculated using the allowable cut runs and district inventory data. In an attempt to place BLM plans in perspective, the predicted structure of habitat in the entire EIS area (as defined in Chapter 2, Animals) was also estimated by applying extremely rough projections of harvest levels (by ownership) on all these lands over the first 10 decades (see Appendix D).

Terrestrial Vertebrates

Transportation System

Road construction would eliminate vegetation from the roadbed. The acreage would vary (see Table 1-1) depending on the alternative selected. Currently about 6,000 acres have been cleared for roads. The added impacts of habitat elimination would be adverse and perpetual since most road systems would be maintained indefinitely. Increased mortality due to collisions with vehicles is unpredictable but probably insignificant.

Harassment of wildlife by increased human intrusion would occur and during stress situations, such as times of temperature extremes, would adversely affect the animal's physiological mechanisms and mortality could occur. New miles of roads mean more access by hunters and increased harvest and harassment is probable. Legal harvest can be limited by regulations adopted by the Oregon Fish and Wildlife Commission but an increase in poaching is probable. This could lead to depressed deer and elk populations in local areas. Examples of other species that are sensitive to human intrusion are, black bear, bobcat and great blue heron.

The proposed action and all alternatives, except 1 and 2, contain recommendations to close some roads in order to reduce harassment and poaching. Past experience has shown these closures difficult to enforce and only partially effective.

Lyon (1979) and Perry and Overly (1977) have shown that elk use is reduced within one-half mile of roads traversing elk habitat. This reduced use varies with terrain, cover, distance and other factors, so an accurate quantification is possible only on a site-specific basis. However, it is estimated that reduced elk use would range from a high of 56,000 acres in Alternative 1 to 43,000 acres in Alternative 10. The reduction in habitat use must be considered adverse. Effects of roads on deer were "variable and relatively insignificant" (Perry and Overly 1977, p.34).

Once roads are effectively closed to use, elk use increases to near normal levels.

Timber Harvest

The greatest effect timber harvest would have on terrestrial vertebrates during the first decade would be the modification of habitat by clearcutting. The amounts range from 44,838 acres in Alternative 1 to 16,433 acres in Alternative 10 (see Table 1-1). The removal of mature and old-growth stands eliminates the habitat of those species of animals adapted to exist there. If similar unoccupied habitat exists nearby, then those displaced individuals could occupy them. It is unlikely that such a situation exists as it is assumed that habitats are currently at carrying capacity. Therefore, unless those displaced individuals can adapt to the new conditions, they would perish.

The results of the mature and old growth analysis described in Chapter 2, Wildlife, are displayed in Table 3-9. This table shows that, over the long term only Alternatives 9 and 10 will provide mature and old growth forests in sufficient amounts (see Table 3-10) and location to maintain minimum viable populations of those animal species dependent on those habitats. If any alternative other than 9 or 10 is selected, the impacts will be extremely adverse. Only Alternatives 5, 9 and 10 would provide habitat blocks closer together than currently exists. If Alternative 5 were adopted, there would not be enough habitat (34 percent large block, 45 percent small block) to support minimum viable populations.

When habitat structure on all lands in the EIS area (see Chapter 2, Animals) is examined (Appendix D), old growth and mature forests would decline in all alternatives. In the long term, all old growth timber remaining in the EIS area would be on Federal lands administered by BLM and U.S. Forest Service. With this reduction of old-growth habitat, a corresponding reduction of old-growth-dwelling populations is probable. Analysis of the sample 5-year timber sale plan indicates approximately 2,500 acres of elk survival cover would be harvested. This must be considered an adverse impact.

Table 3-9 Mature and Old Growth Analysis* (Long Term)

	Large Block (Percent)**	Small Block (Percent)**	Geographic Ties (Percent)**	E-W Block***
Existing Situation	118	164	120	20 miles
Alternative 1	4	30	7	>50 miles
Alternative 2	4	30	7	>50 miles
Alternative 3	4	30	7	>50 miles
Alternative 4	15	33	25	24 miles
Alternative 5	34	45	34	7 miles
Alternative 6	0	0	7	>50 miles
Alternative 7	44	44	55	23 miles
Alternative 8	44	44	55	23 miles
Alternative 9	93	102	93	16 miles
Alternative 10	163	127	145	14 miles

* See Chapter 2, Wildlife, for explanation.
** 100 percent would provide the minimum for maintaining viable populations of animal species requiring mature and old-growth habitats.
*** Distance in miles between large blocks for an East-West tie.

Table 3-10 Acres of Old Growth* (196+) and Percent Change from Existing on BLM-Administered Lands Remaining at the End of Each Decade (Existing as of 1978; 48,400)

Date	Alt.1 Max.Tbr.W/Dep.	Alt.2 Max.Tbr.	Alt.3 Def.Harvest	Alt.4 S.S.D.	Alt. 5 E-W Corridor	Alt. 6 ** No Action	Alt. 7 Original Proposed Action	Alt. 8 No Herb.	Alt. 9 ECO Mgmt.	Alt. 10 Max. ECO
1988	25,5O0(-47%)	26,300 (-46%)	26,800 (-45%)	27,400 (-43%)	27,700 (-43%)	0	28,900 (-40%)	30,900 (-36%)	35,600 (-26%)	48,400 (0)
1998	5,700 (-88%)	5,700 (-88%)	8,000 (-83%)	11,900 (-75%)	12,500 (-74%)	0	17,400 (-64%)	17,400 (-64%)	30,600 (-37%)	50,500 (+ 4%)
2008	6,800 (-86%)	6,800 (-86%)	9,300 (-81%)	13,500 (-72%)	13,800 (-71%)	0	18,600 (-62%)	18,600 (-62%)	31,000 (-36%)	53,900 (+11%)
2018	6,800 (-86%)	6,800 (-86%)	9,300 (-81%)	13,500 (-72%)	13,800 (-71%)	0	17,900 (-63%)	17,900 (-63%)	30,300 (-37%)	54,000 (+12%)
2028	7,300 (-85%)	7,300 (-85%)	9,700 (-80%)	13,900 (-71%)	14,200 (-71%)	0	17,900 (-63%)	17,900 (-63%)	31,000 (-36%)	54,400 (+12%)
2038	7,900 (-84%)	7,900 (-84%)	10,400 (-79%)	14,600 (-70%)	14,500 (-70%)	0	18,000 (-63%)	18,000 (-63%)	33,100 (-32%)	55,200 (+14%)
2048	7,900 (-84%)	7,900 (-84%)	10,500 (-78%)	14,700 (-70%)	14,900 (-69%)	0	18,700 (-61%)	18,700 (-61%)	34,900 (-28%)	55,300 (+14%)
2058	7,900 (-84%)	7,900 (-84%)	10,600 (-78%)	14,900 (-69%)	15,400 (-68%)	0	19,300 (-60%)	19,300 (-60%)	39,500 (-18%)	55,600 (+15%)
2068	8,500 (-82%)	8,500 (-82%)	11,300 (-77%)	15,500 (-68%)	15,800 (-67%)	0	20,700 (-57%)	20,700 (-57%)	44,500 (- 8%)	56,500 (+17%)
2078	8,900 (-82%)	8,900 (-82%)	12,100 (-75%)	16,400 (-66%)	16,500 (-66%)	0	22,300 (-54%)	22,300 (-54%)	46,200 (- 5%)	57,000 (+18%)

* Rounded to nearest 100 acres
** Based on 1970 inventory.

Source: BLM allowable cut printout and district inventory

Decreases in mature habitat (116-195 years old) on BLM-administered lands would occur in all alternatives except 9 and 10. The decreases would have an adverse impact upon the animal populations occurring there. If Alternative 9 and 10 were selected, animal species using mature forests would benefit.

In Alternatives 1 through 9, increases occur in pole/sapling and young second growth and associated animal populations would have corresponding changes (see Appendices D and E).

Early successional stages (1-15 years) following harvest would benefit a few species adapted to highly simplified early seral stage habitats. The deer mouse and pocket gopher are some examples. The usefulness of this stage to wildlife would be limited by successive application of intensive timber management practices. The resulting forest is not a natural successional stage, but a very simplified one, lacking the structure, diversity and micro-habitats of natural stands. Currently, (1978) there are about 64,400 acres of early (less than 15 years old) stage vegetation on BLM-administered timber lands of the SYUs. The changes in this habitat that would occur after the first decade are shown in Appendix F. For the most part, acreage changes in these stages are small but significant impacts are anticipated, except in Alternatives 9 and 10, because of increasing simplification by intensive timber management activities. For example (Harris et al. 1982) has shown that elimination of snags and down logs from short rotation forests can result in a 29 percent reduction in the number of species using that habitat. Where the changes are great, and reductions of these stages occur (Alternatives 9 and 10, 10th decade), it is assumed that the intermingled lands of private ownership will be managed in a manner that provides these younger stages.

In future decades, commercial thinning dramatically increases in all alternatives. Commercial thinning would occur in the pole/sapling and young second growth that account for the majority of habitat remaining at the end of 10 decades (see Table 1-1 for acreage to be thinned during the first decade).

Commercial thinning removes up to 40 percent of the basal area of the forest and has several effects on wildlife habitat. The structure of the forest becomes more simplified and animal species diversity decreases. The stand is opened up and its value as thermal cover is reduced (Edgerton and McConnell 1976). Hiding cover is also reduced and forage may not increase, for as Edgerton (1972) pointed out, deer and elk use was less in partial cut areas (30 percent basal area removed) than in either clearcuts or unlogged stands. These alterations resulting from commercial thinning would result in lowered deer and elk populations in comparison to present day clearcut prescriptions.

Forest birds would be affected, for as Franzreb and Ohmart (1978) show, thinning decreases habitat value for birds that forage by searching in the tree foliage or gleaning in timber. Species such as warblers, vireas and golden-crowned kinglets would be reduced, while ground feeders such as the robin and house wren would increase. Cooper's and sharp-shinned hawks use dense second-growth Douglas-fir as their primary nesting habitat (Reynolds 1971). The quality and quantity of this habitat would be reduced by commercial thinning and harvest in all alternatives except 9 and 10. Table 3-11 shows short and long term populations by alternative.

Table 3-11 Short and Long Term Impacts to Selected Species or Habitats

		Long Term Alternatives										
Species or Habitat	Current Level	1 EFD	2 Max.Tbr.	3 Def.Har.	4 S.S.O.	5 W-W Cor.	6 No Action	7 O.P.A.	8 No Herb.	9 Eco.	10 Full Eco.	Remarks
Bald Eagles (pairs)	1	0	0	0	0	0	0	5	5	10	10	Nesting
Northern Spotted Owls (pairs)	42	0	0	0	4	12	0	19	19	32	39	300 acre habitat
Northern Spotted Owls (pairs)	42	0	0	0	1	8	0	14	14	23	27	1,000 acre habitat
Roosevelt Elk	N/A	75%	-75%	-75%	-75%	-70%	-75%	-45%	-60%	-30%	-20%	Change from Existing
Coopers and Sharp Shinned Hawk	50%	0%	0%	0%	2%	10%	0%	15%	15%	65%	75%	Percent of Potential
Cavity Users	34%	1%	1%	4%	8%	10%	1%	15%	15%	75%	85%	Percent of Potential
Hardwood	90%	9%	9%	20%	21%	22%	8%	28%	90%	100%	100%	Percent of Potential
Riparian	60%	3%	3%	40%	45%	48%	3%	55%	55%	100%	100%	Value Index
Old Growth	N/A	-82%	-82%	-75%	-66%	-66%	-100%	-54%	-54%	-5%	18%	Change from Existing
		Short Term										
Bald Eagles (pairs)	1	0-1	0-1	0-1	0-1	0-1	0-1	1	1	2	2	Nesting
Northern Spotted Owls (pairs)	42	0-9	0-9	0-9	1-9	13	0-5	19	19	29	35	300 acre habitat
Northern Spotted Owls (pairs)	42	0-4	0-4	0-4	1-4	7	0-2	10	10	26	29	1,000 acre habitat
Roosevelt Elk	N/A	-40%	-40%	-40%	-35%	-30%	-45%	-20%	-15%	+5%	+10%	Change from Existing
Coopers and Sharp Shinned Hawk	50%	5%	5%	5%	5%	10%	1%	11%	12%	57%	60%	Percent of Potential
Cavity Users	34%	13%	13%	13%	14%	17%	4%	18%	19%	36%	41%	Percent of Potential
Hardwood	90%	64%	65%	65%	66%	67%	69%	68%	77%	95%	95%	Percent of Potential
Riparian	60%	23%	24%	37%	37%	38%	8%	39%	41%	65%	65%	Value Index
Old Growth	N/A	-47%	-46%	-45%	-43%	-43%	-100%	-40%	-36%	-26%	0	Change from Existing

Source: BLM Eugene District and State Office

The skidding of logs during yarding destroys low vegetation, decayed logs and compacts the soil. The complete but temporary destruction of surface vegetation due to yarding (see Table 3-2) would reduce the amount of habitat for small rodents and insectivores. Ground disturbances that do not remove excessive topsoil may benefit local wildlife populations such as elk and deer, seed-eating birds and certain rodents that depend on early sucessional communities. Swanson (1970 **Cited in** Bunnell and Eastman 1976) reported significantly higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites.

Snag-dependent wildlife such as woodpeckers and other cavity dwellers would be adversely affected due to snag removal during harvest operations. Based on the work of Thomas (1979), three snags of prescribed sizes per acre would provide for maximum populations of primary excavators. To manage primary excavators at the 60 percent level (considered a safe level) requires about two snags (of prescribed sizes) per acre be available. Most private lands are not routinely managed for cavity users, therefore the habitat component maintained on BLM-managed lands is crucial to the survival of snag-dependent species. District surveys revealed that snags and/or wildlife trees are being provided at the rate of 0.04 per acre on recent harvest units.

Table 3-11 lists short term effects on cavity dwellers and as shown only Alternative 10 would maintain levels high enough to maintain viable populations. Table 3-12 was developed to describe expected long-term snag densities on the BLM-administered land base.

As can be seen from Table 3-12, only Alternatives 9 and 10 would reach the 60 percent management level. To provide maximum wildlife benefits, snags should approach an even distribution throughout the land base. Alternatives 9 and 10 are the only ones that would approach even distribution.

For all alternatives except 9 and 10 snag-dwelling species would decline far below BLM target levels in the long term (see Table 3-10). This would be a significant adverse impact as populations would fall well below self-sustaining levels.

New snags are created by natural mortality in the forest. All alternatives would employ some amount of mortality salvage during the decade (see Table 1-1). The number of trees per acre, their age and size are variable and not predictable. While in general the impacts would not be immediately significant, these trees are the snags and down forage logs of the near future and removing them eliminates potential and needed habitats.

Riparian habitat is important as 83 percent of the terrestrial wildlife species in the area use it to some degree. The importance of this habitat is the result of many factors including cover, food, water, edge and microclimate. The maintenance of its values depends on sustaining the structural integrity of the vegetation. Any alteration of its structure decreases its value to terrestrial wildlife. For most riparian areas, best practices for wildlife means no entry.

Alternatives 9 and 10 are the only alternatives which provide any protection to small first and second order streams and transition zones associated with all

Table 3-12 Long-Term Snag Density

Alt.	Percent Management Level	Snag Distribution
1	1	Would not occur on 98 percent of land base;adequate on 2 percent of land base
2	1	Would not occur on 98 percent of land base;adequate on 2 percent of land base
3	4	Would not occur on 98 percent of land base;adequate on 2 percent of land base
4	8	Would not occur on 95 percent of land base; adequate on 5 percent of land base
5	10	Would not occur on 87 percent of land base;adequate on 13 percent of land base
6	1	Would not occur on 98 percent of land base;adequate on 2 percent of land base
7	15	Would not occur on 83 percent of land base;adequate on 17 percent of land base
8	15	Would not occur on 83 percent of land base;adequate on 17 percent of land base
9	75	Would not occur on 4 percent of land base;adequate on 96 percent of land base
10	85	Would not occur on 4 percent of land base; adequate on 96 percent of land base

streams. In a worst case analysis, the approximately 41,000 acres of this habitat (first and second order streams) would be modified and replaced by younger vegetation if any alternative except Alternatives 9 and 10 were selected. Riparian vegetation on third order and larger streams would be logged in Alternatives 1, 2 and 3, as would the transition zone on third order and larger streams in Alternatives 4-8. The impacts to riparian habitat are shown in Table 3-9. If any alternative but 9 or 10 is selected, the impacts would be adverse. Alternatives 1, 2, 3 and 6 are particularly adverse in the long term and the impacts would be significant.

The significance of this impact is amplified as "Habitat alteration [in riparian habitats] will affect wildlife far more than indicated by the proportion of the total area disturbed." (Thomas 1979)

Much of the upland hardwood habitat is in small acreages mixed within softwood stands. Harvest is often incidental, but regardless, this habitat is being eliminated at the rate of about 8,000 acres per decade (BLM District Personnel). As pointed out in Chapter Two, this habitat is used by 13 animal species as optimum. The reduction of this habitat must be considered adverse. Table 3-11 shows impacts to this habitat type by alternative.

Food supplies for grazers and browsers are more readily available in the early successional stages as compared with other successional stages. Deer and elk use would increase and peak 6 to 8 years following clearcutting (Harper 1969; Crouch 1974). However, the food supply may not be utilized if sufficient hiding or escape cover is not nearby. To assure sufficient wildlife cover, clearcuts should not exceed 40 acres. In the sample 5-year timber sale plan, 79 of the 560 sale units would exceed 40 acres in size. The size ranges from 2 to 69 acres, but averages 31 acres. Clearcut size is only part of the mechanism necessary to provide cover near feeding areas. The other is to allow regrowth to provide cover (about 10 years) prior to clearcutting on adjacent lands. Without this timing, the forage created may not be utilized as no cover is available. Only Alternatives 9 and 10 make allowances for the time between adjacent clearcuts. If any other alternative is selected, utilization of forage may be restricted. This must be considered an adverse impact.

Other Timber Management Treatments

Other treatments (Table 1-1) alter animal habitat through vegetative manipulation.

Slash burning would eliminate most live vegetation from the site and 80 to 90 percent of the combustible material less than 3 inches in diameter would be consumed. Larger material is generally charred in place. Table 1-1 lists acres to be burned for all alternatives. These effects vary with the intensity of the burn, but immediate impacts would be removal of vegetation and associated animal populations. This would last less than one growing season, after which a vigorous growth of grasses and forbs would appear and animal populations adapted to early successional stage vegetation would be re-established. However all areas to be slash burned are cleared of snags to preclude spread of wildfire. This is an adverse impact to snag-dwelling species.

The removal of woody material reduces obstructions to deer (Crouch 1974). Other species such as juncos and wrens use logging slash as activity centers. Juncos declined when slash was burned. (Franzeb and Omart 1978). Charring of the larger material removes bark and eliminates micro-habitats for invertebrates that are an important item in the food chain. In addition, the resulting habitats lack structure that slash provided and are more simplified.

Harper (1969) reported higher Roosevelt elk use on logging sites that had been burned than on those that had not been burned, and explains that on burned sites grasses were more than three times as abundant. Grasses are a preferred food item of elk. He warned, however, that slash burning would not necessarily increase forage and subsequent elk use on all sites as physical characteristics make each site different in its response to burning. Also, Crouch (1974) indicated that slash burning increased the food supply for black-tailed deer.

Mechanical piling of slash would cause soil disturbance and have impacts similar to those caused by yarding. Piling removes downed slash that may cause barriers to large ungulates but can result in large barriers if windrowed.

All alternatives except 8 call for herbicide use in site preparation and conifer release during the decade. The impacts from herbicide use in all alternatives except Alternative 8 are the same, only the magnitude changes. (See Table 1-2 for acres treated.)

There are four major types of impacts to animals that could be associated with silvicultural herbicide application: exposure to toxic chemical levels, exposure to chronic levels, habitat modification and carrier impacts. The following is a brief discussion of these four impacts. For much greater detail, refer to BLM's FEIS on Vegetation Management with Herbicides: Western Oregon (USDI, BLM 1978) and Final South Coast Curry Timber Management Environmental Impact Statement (USDI, BLM 1981b).

Exposure to acute toxicity levels of herbicides is not anticipated as none of those proposed for use have been reported to be highly toxic to wildife when used as the manufacturer's label prescribes.

Chronic (long-term) effects of herbicides on animals are generally unknown in those herbicides proposed for use. It seems unlikely that an indivudual animal

would be exposed to repeated treatments. Therefore, the potential danger to wildlife from acute or chronic poisoning is unlikely at the proposed use rate.

Herbicides have pronounced impacts on wildlife habitat. These impacts are brought about by losses of habitat diversity and stratification resulting from the reduction of certain plants that are in competition with the desired coniferous species. This would adversely impact those animals that utilize the grass/forb and shrub/seedling successional stages.

Diesel oil is sometimes used as a carrier for forest herbicides. Data on the toxicity of diesel oil on wildlife are limited; however, some work has been done on the adverse effects on adult ducks (Tucker and Crabtree 1970; Hartung 1966; Hartung 1965). It is unlikely that wild animals would consume lethal amounts of the carrier because of the dilution factors involved. It may, however, adversely affect the palatability of the forage. Other potential impacts include the coating of eggs, thereby affecting their hatchability, and the wetting of individuals, making them more susceptible to other environmental stresses. However, data are insufficient to predict the impacts of diesel oil carrier on animals in the EIS area.

Precommercial thinning, although it may open a young forest canopy, generally does not benefit deer and elk because the unremoved slash impedes movements. The obstacle presented by slash accumulations restricts deer and elk from utilizing any forage increases which result from the thinnings. Cover use is also restricted by slash accumulations. Therefore, reduced deer and elk use would occur on those acres precommercially thinned (see Table 1-1). This condition could last as long as two decades before decomposition removed the obstacles.

Conversely, birds and small mammals may increase their use of an area following precommercial thinning. Slash accumulations provide cover for them and any increases in forage production can be utilized. However precommercial thinning combined with commercial thinning will, in the long term, essentially eliminate populations of coopers and sharp-shinned hawks in all alternatives except 9 and 10.

Fertilization increases the growth and palatability of many plant species. These increases may be utilized by wildlife which would be a short-term positive impact.

Fish

Impacts of timber management on fish and aquatic habitat fall into the broad categories of increased accumulation of bottom sediments, increased amounts of suspended sediments, altered amounts of stream flow, introduction of logging debris, change of water temperature, destabilization of banks and channels, reduction of instream structure and lower productivity.

The impacts from the ten alternatives differ primarily in magnitude. These differences reflect the acres of land treated, miles of road built and presence and size of buffers. For instance, Alternative 10 has the fewest miles constructed, while Alternatives 1, 2 and 9 have the most miles of road constructed. (See Table 1-1 for all treatments.)

On lands administered by BLM in the SYUs, there are approximately 390 miles of streams that support cold water fish (see Table 2-9). Analysis of the sample 5-year timber sale plan shows that approximately 40 miles of stream that support cold water fish pass through or are adjacent to 167 harvest units.

The habitat of aquatic invertebrates, which are important both as food for fish and as indicators of stream quality, can also be modified or destroyed by the same factors that affect fish habitat. It is assumed that impacts to most invertebrates would be similar to those experienced by fish in localized areas. Research by Erman et al. (1977) revealed that when buffer strips of at least 30 meters (about 98 feet) width on each side were maintained, the macro-invertebrate populations were indistinguishable from those of unlogged streams in the first few years following timber harvest.

Maintenance of buffers helps minimize stream degradation. Alternatives 1 and 2 have no provisions for buffer strips except for standards of the Oregon Forest Practices Act and stream productivity might be adversely affected.

Initial impacts on aquatic habitat are a result of surface disturbance, channel disturbance and land treatment, leading to increased erosion and channel instability. Where buffers are maintained, erosion and subsequent decline in water quality are minimized. If the larger trees, over 100 feet in length, are removed from the buffer, the overall quality of habitat will decline even when hardwood buffers protect water quality. Woody material provides a major source of habitat diversity and spawning areas, forming pools and cover, and trapping gravels that are used for spawning and food production. When larger trees are removed, the woody structure in the stream is reduced as large woody material moves out of the system and is not replaced. This leads to a decline in productive capability of the stream. The results in a basin tend to be cumalative through time as larger areas are harvested. Shifting to a shorter term rotation does not permit streamside trees to reach sufficient size to provide woody structures in all stream orders unless retained, such as in Alternatives 9 and 10. Some benefits would be provided by maintaining buffers on third order and larger streams in Alternatives 4 through 7.

Chapter 3, Impacts on Water Resources, provides data on expected amounts of sediments and water that would reach the streams of the SYUs. Many of the analyses and conclusions appearing in this section are based on those data.

Transportation System

The construction of roads can add greatly to the sediment load of a river. In Alternatives 1, 2, 3, 4, 7, 8 and 9 road building during the decade would be more than in the past decade (Alternative 6); however, sedimentation from road building would be increased in Alternatives 1 and 2 due to the effect of stream buffers (see Table 3-6). This increase in sediment is adverse.

In discussing impacts to the aquatic invertebrates, Erman et al. (1977) suggest that repeated failure of road crossings was the cause of disruption of the stream biota, not the construction of road crossings. Investigations in the vicinity of newly installed culverts showed only a slight impact.

Three new roads identified in the sample 5-year timber sale plan would cross streams with fishery values. All are on stable soils so only short-term localized impacts are expected.

Timber Harvest

Timber harvest can have an adverse impact on fish habitat by removing the riparian zone, changing water yield and increasing sedimentation.

Removing the riparian zone, including old-growth conifers, would increase the amount of fine organic material, reduce the number and quality of pools, reduce useable spawning gravels, reduce macro-invertebrate production areas, destablize banks and channels, and increase water velocities. Logging riparian zones would also increase siltation of stream bottoms and change temperature regimes by decreasing shade. However, where streamside buffers are retained, no change in temperature was observed (Brown and Krygier 1970). Water temperatures would not increase if Alternatives 3, 4, 5, 7, 8, 9, or 10 were selected. Alternatives 1, 2, and 6 make minimal provision for riparian buffers and water temperatures would increase. These increases are not quantified but impacts are expected to be adverse.

Clearcutting increases water yield (see Impacts on Water Resources), which could have a scouring effect on stream bottoms, thereby removing gravel and aquatic vegetation. Based on the analysis described in Chapter 3, it is estimated that water yield changes would have a negligible impact to the SYUs as a whole.

Harvest and yarding could contribute considerable sediment to local streams. Increases in bottom sediments, according to Gibbons and Salo (1973), cause the most damage of all factors affecting aquatic life. The amount of sedimentation would depend on the alternative selected. Two alternatives would result in increases compared to past activities; seven would decrease sedimentation while one (Alternative 6) would remain the same (see Table 3-6).

Other Timber Management Treatments

Burning, animal damage control, precommercial thinning and fertilization are not expected to have a significant impact on fish.

The chemicals proposed for use for vegetation control and the levels of their application are not expected to measurably affect aquatic vegetation. Streamside vegetation that provides shade could be altered in a worst case circumstance. Buffer strips along streams should prevent this from occurring. However, due to applicator error, some parts of these buffer strip may receive applications, and some detectable amounts may reach the stream.

Toxic effects of herbicides on fish have been documented in the laboratory (U.S. EPA 1977). However, proposed field application rates would be considerably less than the minimum lethal dose for those species tested and toxic effects are not expected. (See BLM's FEIS Vegetation Management with Herbicides, Western Oregon 1978 through 1987, for more detailed information.) It should be noted that long-term effects, particularly under field conditions, are more difficult to determine than are effects in short-term laboratory tests. Also, Cameron and Anderson (1977) felt that more study use was needed in order to evaluate the impacts to aquatic plants and animals under field conditions. However, Cameron and Anderson's monitoring program in 1977 and Anderson's monitoring in 1979 showed that amounts of herbicides in streams did not exceed EPA's "safe" level standards.

Table 3-13 estimates change in cold water fish populations based on water quality and structural habitat.

Threatened and Endangered Animals

Threatened and endangered species receive special attention under the terms of the Endangered Species Act of 1973, as amended, and BLM policies and guidelines. Known nest and roost sites of these species are avoided and special precautions taken to

Table 3-13 Changes* in Coldwater Fish Populations (Percent)

	Alternatives									
	1	2	3	4	5	6	7	8	9	10
1st Decade	-10	-10	+10	+10	+10	+10	+10	+10	+20	+20
10th Decade	-30	-30	-30	+25	+25	+10	+25	+25	+50	+50

* Change from existing

Source: BLM District and State Office personnel

ensure their well being. (Chapter 1, Forest Management Treatments and Design Elements) Therefore no adverse impacts are expected to occur to these existing sites.

Transportation System

Threatened or endangered species would probably be affected only to the extent that road construction could open previously unaccessible areas. This impact cannot be quantified or qualified.

Timber Harvest

No alternative nest sites for bald eagles are provided for in Alternatives 1 through 6. In the short term, it is possible that the existing nest site may be destroyed by natural events and in the long term it is probable. This would be a significant adverse impact (see Table 3-11).

Twenty-two potential bald eagle nest and roost sites have been identified on the Eugene District. These have been located in cooperation with the bald eagle recovery team (USFWS) and their locations incorporated in the Draft Pacific Bald Eagle Recovery Plan. Only Alternatives 9 and 10 completely protect these potential sites. Analysis of the sample 5-year timber sale plan reveals six of these locations scheduled for harvest. This would have an adverse affect on opportunities for the bald eagle population to expand.

Habitat modifications caused by clearcutting would have major impacts on old growth-dwelling species. The northern spotted owl, a State-listed species, is dependent on old-growth closed-canopy forests and would be greatly affected.

The original Oregon Endangered Species Task Force management recommendations for each pair of owls (in effect during the preparation of the proposed MFP), called for total protection of 300 acres of old-growth core area (if available) and an additional 900 acres to be managed to provide at least 50 percent of the acreage in stands of 30 year-old forests. Currently 39 pair occupy habitat that meet this criterion. Assuming that these recommendations identify minimum essential habitat, Tables 3-11 and 3-14 indicates the pairs of owls remaining after 1 and 10 decades.

Examination of the sample 5-year timber sale plan reveals planned harvest units would impact the habitat of 32 of the 42 known pairs. These impacts are adverse.

Table 3-14 Northern Spotted Owl Habitat Remaining After One and Ten Decades (Pairs Supported)

	1st Decade		10th Decade	
Alternative	300 Acre Criteria	1,000 Acre Criteria	300 Acre Criteria	1,000 Acre Criteria
1	0-9	0-4	0	0
2	0-9	0-4	0	0
3	0-9	0-4	0	0
4	1-9	1-4	1	1
5	13	7	12	8
6	0-5	0-2	0	0
7	19	10	19	12
8	19	10	19	12
9	29	26	41	27
10	35	29	54	41

A revision of Task Force recommendations has resulted from recent data. The revision recommends that forests be managed to provide 1,000 acres of old growth per pair of owls within 1.5 mile radius of nest sites. Currently, 27 pairs occupy habitat that meets this criterion. Implementation of the new recommendations in the Eugene District would be limited by the extent of the existing old growth forest. The analysis of the relationship of the alternatives to spotted owl habitat found in Table 3-14 is based on the assumption that the revised recommendations identify minimum essential habitat.

Conclusions

With the exception of Alternatives 9 and 10, both the short- and long-term changes that occur in habitat diversity and reduction of old-growth would have an adverse impact to wildlife in general and old growth species in particular. Alternatives 1, 2 and 6 drastically reduce mature and old-growth habitat and selection of one of those alternatives would have extremely adverse impacts. In addition, intensive forest practices would lead to even age stands of predominately Douglas-fir that would greatly reduce habitat diversity and adversely impact wildlife.

Simplification of forest habitats would also have a great effect on wildlife. Pole sapling and young second growth (which would account for most of the forests, except in Alternative 10,) have low environmental variables (simple structure) even under natural conditions. Further loss of structure from thinning would make these age classes of very low value for most wildlife. Further simplification resulting from broadcast burning and herbicides would add to the loss of diversity. This long-term simplification and loss of diversity would be significant and adverse.

Snag-dependent wildlife, possibly already below viable levels, would decline even further if any alternative but 9 or 10 were selected. This must be considered a significant adverse impact.

Riparian habitat occupies about 5 percent of the forest land base and is used by 83 percent of the terrestrial wildlife species. This critical habitat would be adversely impacted if any alternative but 9 or 10 were selected. These impacts would be adverse and significant to wildlife. Impacts would be particularly severe if Alternatives 1, 2, or 6 were chosen.

Habitat removed by road construction would be permanently and irretrievably lost on those roads proposed as part of the permanent road system. The construction of new roads would lead to harassment of wildlife and reduce useable elk and large carnivore habitat within one-half mile of these roads. Planned road closures would reduce this impact.

Deer numbers are not expected to be greatly modified by any of the alternatives in the short term, but once commercial thinning dominates the harvest, populations may be reduced. However, because of different requirements, elk numbers would be greatly influenced by many of the alternatives. The changes would be due to changing habitat conditions, new road construction, thinning and other habitat modifers. Using cover-forage ratios and cover quality, Table 3-15 was developed and shows estimated changes in elk populations by alternative.

Cold water fish populations are expected to decline in the short-term if Alternative 1 or 2 were selected. Increases are expected if any other alternative is chosen (see Table 3-13).

The bald eagle (Federal listed as Threatened) would be adversly impacted in the long term if Alternatives 1-6 were selected.

The northern spotted owl is the only species listed by the State of Oregon as threatened that would be adversely impacted. The original recommendations of the Oregon Endangered Species Task Force were

Table 3-15 Estimated Elk Population Changes (from existing) on BLM-administered Lands (Percent)

Alternative	1st Decade	2nd Decade	5th Decade	10th Decade
1	-40	-60	-85	-60
2	-40	-60	-85	-60
3	-40	-60	-85	-60
4	-35	-55	-85	-60
5	-30	-45	-65	-45
6	-45	-75	-85	-75
7	-20	-30	-45	-40
8	-15	-25	-40	-25
9	+5	0	-10	0
10	+10	+10	0	+10

Source: BLM District personnel

considered in formulating alternatives for this EIS. Assuming that these recommendations identify minimum essential habitat, only Alternatives 9 and 10 would protect habitat of enough owls to meet recommended levels, although Alternatives 7 and 8 are close. A recent revision of the Task Force recommendations indicates that minimum habitat requirements may be greater. If so, Alternatives 9 and 10 would provide habitat for 27 and 41 pairs, respectively (see Table 3-14).

The cumulative effects on the northern spotted owl would be severe, particularly in the Coast Range. BLM's current Medford District land use plans provide for the protection of 14 pair, the original Task Force recommendation. The proposed decision for the Coos Bay District was recently announced. Coos Bay would protect habitat for six to eight pair in the short term and three to four in the long term. This is far below original Task Force recommendation of pair. The same recommendation was for the Eugene District to provide habitat for 23 pair. Eugene's Preferred Alternative would protect habitat for up to 9 pair in the short term and 1 pair in the long term. If the trend is not meeting the Task Force's recommendation continues on other BLM Westside districts, the cumulative loss of habitat will adversely effect the spotted owl.

Based on the Coos Bay proposed decision, it seems likely that even if Alternative 9 or 10 were selected, the Coast Range population would begin to fall below that necessary to remain a viable population. This would be even more certain if any other alternative were selected. The population in the Cascades would not be greatly affected due to the large amount of Forest Service lands available; however, a larger burden for the protection of the spotted owl in the Cascades would be shifted to that agency.

IMPACTS ON RECREATION

Each alternative varies in approach and emphasis on meeting recreational needs. Some localized recreational demand would not be met if areas and facilities are not provided. The provision of areas and facilities for recreational pursuits would be beneficial since opportunities would be available to meet increasing demand.

The alternatives provide for varying degrees of protection, use and maintenance of existing recreation sites. Generally, Alternatives 1, 2 and 6 have minimal or no provisions to preserve opportunities for additional recreation site development. Alternatives 3, 4, 5, 7, 8, 9 and 10 allow for the protection of recreation development opportunities. Assuming these developments are realized, these alternatives would adequately meet increasing demand on public lands related to such activities as camping, picnicking, hiking, horseback riding, swimming and water-oriented use.

The impacts of timber management on recreation are also related to changes in the physical setting. From the setting, recreationists derive different satisfactions, experiences and benefits. As changes in the setting affect experiences, levels and patterns of visitor use change. For example, in one area recreation use might be facilitated by road construction. In another area, visitation may show a long-term decline if the area's setting or resource availability is significantly altered. Some visitors may relocate to other areas where opportunities for desired experiences exist.

As natural or natural-appearing environments are altered due to timber harvest, opportunities related to appreciation of the natural environment are reduced. Opportunities for such activities as camping, hiking, fishing, hunting, nature study and sightseeing would be degraded in some areas. The degree and magnitude of impact would be dependent upon the level of intensive timber management under each alternative.

Clearcutting can also enhance certain recreational activities such as hunting, collecting, berry picking, general sightseeing, picknicking and using ORVs by creating areas, improving access or providing openings for scenic views. The impacts of clearcutting would be most significant under Alternative 1 and least under Alternative 10.

Many timber management activities create noise, odors, dust, fumes and additional traffic. Some recreation opportunities would be degraded by these factors. However, many road-oriented dispersed recreationists indicate that impacts of timber management do not detract from their enjoyment of an area (Downing and Clark 1979).

Area-wide impacts to fishing and hunting success are dependent upon impacts to the species (see Impacts on Animals). In the short term, demand for hunting would be met under all alternatives. In the long term, significant elk population decreases under all alternatives except Alternative 10 (see Table 3-15) would lead to decreased elk hunting success and a corresponding reduction in hunter use. Declining fish populations under Alternatives 1 and 2 would result in a similar reduction in fishing success and related angler use (see Impacts to Animals, Conclusion). Decreased hunting and fishing success could result in a relocation of these recreationists to other areas, if available, with better opportunities for success.

Analysis of the sample 5-year timber sale plan indicates that some reductions or increases in visitor use could occur at specific sites. Logging activity near some overnight and day use facilities may create adverse visual and audible impacts which

would degrade the recreation experience for some facility users. Accessibility for dispersed recreation dependent on vehicular access would be improved as a result of new road construction. Harvest units in areas offering off-road vehicle opportunities would not create significant adverse impacts but could result in slight increases in visitor use at these areas.

Under Alternatives 1, 2, 4, 5 and 6 timber harvest would likely create impacts to sightseeing opportunities at Teeter Creek Springs and Blachly Wayside and to semi-primitive recreation values at Windy Peak. Under Alternatives 3, 7 and 8, impacts could occur at Blachly Wayside and Windy Peak. Under Alternatives 9 and 10, these areas would be protected.

Environmental assessments which precede each timber sale will provide a site specific analysis of the potential impacts identified during the analysis of the sample 5 year timber sale plan.

Impacts to the potential Siuslaw National wild, scenic or recreational river will be further analyzed in the environmental assessments which precede each timber sale. If it is determined during site specific analysis that timber management actions could adversely affect potential suitability of that section of the Siuslaw River as a component of the National wild and scenic rivers system, BLM would consult with the National Park Service to develop appropriate mitigation measures. There are six timber sales in the sample 5-year timber sale plan within one-quarter mile of this river.

Conclusions

Visitor use increases or reductions may occur in certain areas as a result of impacts to specific recreation experiences. Alternatives 1, 2, 4, 5 and 6 would serve to adequately meet increasing demand for motorized recreational vehicle use and some dispersed use areas. However, under these alternatives, demand associated with many other activities (e.g., hunting, fishing, watersport areas and developed site use) would not be met due to a loss of development opportunities, degradation of the desired recreation experience and effects on recreation-related wildlife populations.

Alternatives 3, 4, 7, 8, 9 and 10 would serve to meet most recreational needs. In the long term, however, significant elk population decreases under all alternatives except 10 would result in lower hunting success and a corresponding reduction in elk hunter use. Under Alternatives 1 and 2 declining fish populations would result in a lower fishing success and some decrease in related angler use. A lower desirability of BLM-administered lands for fishing and elk hunting would occur.

IMPACTS ON CULTURAL RESOURCES

Complete area-wide field surveys of the SYUs to identify cultural sites have not been undertaken. However, complete cultural resource surveys will precede each specific timber management action that would result in ground disturbance or transfer of title (BLM Manual 8100, Cultural Resource Management). Under all alternatives, sites identified during these surveys would be protected in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR Part 800).

Cultural resources not identified by intensive field survey could be inadvertently impacted under all alternatives. The potential for damage would be a function of the alternative's timber harvest level. Adverse impacts to such sites could occur through soil compaction, soil movement and/or chemical alteration by fire or mixing of organic matter. The potential for damage from timber management activity to undiscovered sites would be greatest under Alternative 1 and least under Alternative 10. In a worst case, impacts would completely obliterate a site's remains.

Road construction would provide additional access to known cultural sites, resulting in increased visitation. Vandalism, theft and site erosion could result. Esthetic, recreational, interpretive and educational qualities of the sites could be degraded. Road construction and/or timber removal on slopes above sites could result in increased rates of erosion and soil slumpage onto sites. These adverse impacts would be most likely under Alternatives 1, 2 and 9 and least likely under Alternative 10.

The landscape and vegetation surrounding a cultural site which compose its visual setting may be impacted by timber harvesting and road construction. Such impacts could reduce the site's esthetic appeal for recreation, interpretation and education. Impacts to the visual settings of cultural sites would be most likely under Alternative 1 and least likely under Alternative 10. Site specific analyses of sales will be included in the environmental assessments which precede each timber management action. Should potential impacts to a site's setting integrity be identified, design art techniques and other constraints may serve to mitigate adverse impacts.

Conclusions

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under all alternatives. Undiscovered cultural sites would be susceptible to damage from artifact breakage or destruction, displacement of materials and contamination of organic matter. Once a site is found, however, mitigation measures would be taken to minimize or avoid future damage. Under all alternatives, sites identified before logging would be managed to protect scientific and/or interpretive values.

IMPACTS ON VISUAL RESOURCES

Most timber management practices disrupt the land surface, change vegetative patterns, alter species composition, and thereby create visible contrasts (see Glossary) in the landscape. Assessing contrast for a proposed activity can indicate the severity of impact and help identify mitigation measures to reduce the contrast and meet VRM class objectives for an area (BLM Manual 8440). Environmental assessments will address site specific visual impacts and apply the Bureau's contrast rating system (see Glossary) to specific timber management actions. The severity of an impact on visual resources depends on such factors as landscape elements; location, number, size and shape of clearcut units; location and design of roads; yarding methods; amount and treatment of debris; and success of vegetative reestablishment in disturbed areas.

Visual resource management (VRM) classes (see Chapter 2) are based on an inventory and evaluation of the area's scenic quality, sensitivity and distance zone (see Glossary). During the land use planning process, VRM classes as described in Chapter 2 may be changed to resolve conflicts between visual and other resources (BLM Manual 8411) or to account for visual management feasibility based on intermingled land ownership patterns. Upgrading an area's recommended VRM class would provide adequate scenic value protection and result in beneficial impacts. Downgrading VRM classes increases the potential for adverse visual impacts. As an example, an area in the affected environment recommended as VRM Class II but subsequently managed as Class III or IV would receive less protection. Consequently, the long-term effect of downgrading might be to lower scenic quality in adjacent areas even though the Bureau's ability to affect an area's overall scenic quality is often limited by intermingled land ownership patterns (see Figure 1-1). In some cases, the impacts of BLM timber management activities would be consistent with those on surrounding areas and would not create significant contrasts, but could tend to compound the degree of contrast by enlarging the scale of modification.

Table 3-16 gives total acreage for each VRM class by alternative. Under Alternatives 9 and 10 visual resource conditions (scenic quality) would improve. Adverse visual impacts in highly scenic and sensitive areas would not occur or would be mitigated. Adverse visual impacts under Alternatives 3, 4, 5, 7 and 8 would be moderate. Some highly scenic and/or sensitive areas would be protected. Attempts would be made to mitigate adverse impacts on all public lands. Protection would be afforded to Horse Rock Ridge, Elk Meadows and 300 acres in the McKenzie River corridor. Potential adverse impacts would be likely in viewsheds near waterfalls, the McKenzie River, Interstate 5, Dorena Reservoir, Cottage Grove, Triangle Lake, Highway 36 and Highway 126. To a lesser degree, impacts would also occur along some county roads, within some drainages and within the viewsheds of some rural residential areas.

Under Alternatives 1, 2 and 6 adverse visual impacts would be high. No protection would be provided for highly scenic and/or sensitive areas.

Analysis of the sample 5-year timber sale plan indicates that the potential for impacts due to clearcutting would be greatest in foreground-

Table 3-16 VRM Classes (acres)

VRM Class	Affected [1] Environment	Alternatives 1,2,6	3,4,5,7,8	9	10
I	117	0	270	270	270
II	42,000	0	0	37,350	119,250
III	78,068	0	300	81,900	0
IV	196,562	316,747	316,177	197,227	197,227
Total	316,747	316,747	316,747	316,747	316,747

[1] VRM class acreage as recommended through the visual resource inventory and evaluation of the existing environment (see Chapter 2).

middleground areas with high scenic quality and high sensitivity. Following application of the contrast rating system, necessary mitigation measures would be identified. Depending upon VRM class objectives, possible mitigation measures under all alternatives except 1 include manipulating the size and shape of clearcut units, partial cutting, longer harvest cycles, screening with buffer strips, hydromulching road cuts and fills, complete debris disposal, replanting with a conifer mixture and other special techniques.

The adverse visual impacts of herbicide use would go unmitigated and would occur under all alternatives except Alternative 8. In short term, vegetation sprayed with herbicides would create highly visible contrasts. In the long term, vegetative variety would be reduced as herbicides encourage conifers at the expense of other vegetation of high visual interest. Herbicides used on tall broadleaf species (madrone, oak, alder) cause long-term impacts of up to 20 years or until the dead vegetation is over-topped. Under all alternatives except 8, 9, and 10 the impacts of herbicide use would be greater than under the existing situation (see Impacts on Vegetation).

IMPACTS ON AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Area of Critical Environmental Concern (ACEC) designation would improve management focus and provide guidelines to help achieve protection of important and relevant resource values. The alternatives vary in levels of ACEC designation.

Under Alternatives 3, 4, 5, 7, 8, 9 and 10, no impacts would occur to those 7 areas qualified for ACEC designation. Under Alternatives 1, 2, 5 and 6, the Fox Hollow, Camas Swale and Mohawk areas may be adversely impacted if they are not designated or do not receive other protective management.

Analysis of the sample 5-year timber sale plan indicates no sales would adversely impact those areas qualified for ACEC designation.

IMPACTS ON SPECIAL AREAS

Under Alternatives 3, 4, 5, 7, 8, 9 and 10, no impacts would occur to the four potential Research Natural Areas and three Environmental Education Areas. Under Alternatives 1, 2 and 6, the seven sites with natural or environmental education values may be adversely impacted if they do not receive protective management.

Analysis of the sample 5-year timber sale plan indicates that no sales would adversely impact those areas with known or suspected natural or environmental education values.

IMPACTS TO HUMAN HEALTH

The possibility of human health being impacted by the use of herbicides is related to the toxicity of the herbicide and the likelihood of exposure (Norris 1975). While there are no chemicals that are non-toxic, a substance of moderate or high toxicity may represent no significant hazard if exposure is very low, just as a relatively non-toxic agent may be harmful if exposure is extensive and long term. Herbicides proposed for use in the SYUs are given in Table 1-2 and the herbicides toxicities and activities are given in Table 3-17.

In general, exposure of humans to herbicides can occur in two ways: directly, as in the case of applicators, or indirectly. The number of persons that could be directly affected by herbicide application in the SYU's is very small. Indirect exposure from contact with recently sprayed vegetation or contaminated streams is more likely to occur than is direct contact. Planned delivery techniques would reduce or prevent spray from drifting onto streams and water bodies. Areas to be sprayed would be posted after spraying. Contact with newly sprayed vegetation could occur should someone traverse a sprayed area; however, contact with newly sprayed vegetation would be discouraged for several hours after treatment. After the application has dried, the chemical will have been absorbed into the foliage or adsorbed onto the surfaces of soil and litter particles and become unavailable on contact to individuals traversing the area. Because of the limited toxicity of the herbicides and the low potential for exposure, the likelihood of an adverse impact on human health is negligible.

All herbicides proposed for use in the SYUs are registered with the Environmental Protection Agency (EPA). The EPA recently reviewed all the available research about potential health effects of 2,4-D. Based on this review, the EPA concluded that the continued use of 2,4-D does not pose an imminent hazard or unreasonable adverse effect when used according to label precautions and directions for use (U.S. EPA 1980). EPA has asked manufacturers to conduct more tests to bring the knowledge about 2,4-D up to standards currently required for the registration of new chemicals.

Silvex and 2,4,5-T are restricted, and all uses that were suspended are still suspended (EPA).

Table 3-17 Herbicide Toxicity

Common Name	LD_{50} (Rats)	Commonly Used Term [1]	Activity in the Soil
Asulam (Asulox)	8,000 mg/kg	practically non-toxic	short persistence--half-life 6 to 14 days.
Atrazine	3,080 mg/kg	slightly toxic	absorbed on muck or clay--remains in 1 foot of soil.
2,4-D	300-1,000 mg/kg	moderately toxic to slightly toxic	leached in sandy soils, breakdown depends on microbial activity.
Dalapon (Dowpon)	7,570 mg/kg (female) 9,330 mg/kg (male)	practically non-toxic	leaches readily in soil, breakdown rapid and complete.
Glyphosate (Roundup)	4,320-4,900 mg/kg	slightly toxic	strong absorbtion--very little or no leaching.
Krenite	24,400 mg/kg	relatively harmless	rapid degradation--very little movement.
Picloram (Tordon)	8,200 mg/kg	practically non-toxic	absorption by organic matter and clays, may leach in sandy soils.
Triclopyr (Garlon)	2,140-2,830 mg/kg	slightly toxic	possible leaching, half-life of 46 day.

[1] Moderately toxic is 50-500 mg/kg; slightly toxic is 500-5,000 mg/kg; practically non-toxic is 5,000-15,000 mg/kg; relatively harmless is more than 15,000 mg/kg in a single oral dose to rats.

Some pesticides currently available and in use by BLM were at one time supported for registration by laboratory tests conducted by Industrial Biotest Labs (IBT). Various tests done by IBT were found to be invalid 5 to 6 years ago (U.S. EPA 1977). At that time, EPA initiated investigations to determine if the invalidity of these tests created data gaps so critical that use of any pesticide supported in registration by IBT tests created an immediate hazard to humans and/or the environment. It has not been determined whether these invalid tests have created such an imminent risk.

Public concern over the continuing use of herbicides in forestry resulted in a joint position statement issued in April 1981 by the U.S. Forest Service, Environmental Protection Agency and the U.S. Bureau of Land Management. This statement concluded that, "An assessment of current data on these chemicals (Asulam, Dicamba, Krenite MSMA, Picloram, Atrazine, 2,4-D and Simazine) coupled with the anticipated exposure indicates no reason to believe that they are posing an unreasonable risk to human health or the environment when used in accordance with the label requirements."

The toxicological data supporting the registration of Roundup and Krenite are for the greatest part proprietary. This means that these data have been provided to EPA for analysis and judgment but are not available to any other party. It is necessary, therefore, to rely primarily on the judgement of EPA, as reflected on the product label, that these herbicides are safe for forestry use.

A wide variety of mutagenesis assays have been conducted on 2,4-D. A few have shown evidence of positive effects at high concentrations. (These data are summarized in an affidavit by F.N. Dost on file in the U.S. Attorney's Office in Portland, Oregon and a copy is available for review in the Eugene District Office in Eugene, Oregon.)

IMPACTS ON ECONOMIC CONDITIONS

The socio-economic impacts are presented here for two different bases as a means of differentiating between the effects of potential timber management programs on existing socio-economic conditions and their effects on the conditions expected to occur if the current timber management program were continued. The program manager must know how future conditions would be affected if the program were changed. The public is generally most concerned with how future conditions would differ from existing conditions. The impacts are presented mainly in table form, as changes measured from the existing condition and as changes measured from the no action condition--the condition expected if the current management program were continued. The average 12-month harvest from the Eugene District from 1978 to 1981 was 187.3 MMBF. This recent experience is the baseline labeled the existing conditions. The no action alternative, 219 MMBF per year, is the level which would have prevailed if the decadal allowable harvest (2,190 MMBF) had been sold and harvested in constant annual increments. The average level of actual sales for 1978-1981 was 214.2 MMBF and for 1972-1977 was 218.5 MMBF.

Table 3-18 shows projects representing average annual local employment and earnings potential of timber sales under all alternatives during the first decade after implementation. Impacts on employment and earnings would be phased in over a period of 2 or 3 years due to the customary time lag between sale and harvest. Impacts on receipts distribution would be delayed an additional year. The projections represent the local employment and earnings which would be realized if the annual volume sold under each alternative were promptly harvested and processed.

Table 3-19 focuses on the impacts each alternative is projected to have on public revenue. Under the O&C Act (1937) and subsequent modifications, 50 percent of the receipts from timber sales on revested O&C lands are distributed to designated county governments. The recipients are those counties in which O&C lands are situated and the basis for distribution is established in the O&C Act (1937). The Act and its modifications establish that for each $100 in receipts from harvest of O&C timber, disbursements to the counties would be $50: Lane County would receive $7.64 and Linn County would receive $1.32. Average annual disbursements to O&C counties from the SYUs are projected to range from $30 million (1980 dollars) in Alternative 1 to $9 million in Alternative 10 (Table 3-19). When compared to the no action condition, Lane County receipts from the harvest of timber on O&C lands in the Eugene District would increase by as much as $550,000 in Alternative 1 or fall by as much as $2,740,000 in Alternative 10.

Table 3-18 Impacts Compared to No Action (and Existing) Condition on Local Employment and Earnings (Average annual amounts during first decade)

		Timber Industry Employment (Jobs)						Wildlife* and Recreation Dependent Employment (Jobs)		Total Employment (Jobs)				Total Earnings (Millions of 1979 dollars)			
		Logging and Processing				Forest Management											
		Lane & Linn Counties		Total for Western Oregon		Lane & Linn Counties		Lane & Linn Counties		Lane & Linn Counties		Total or Western Oregon		Lane & Linn Counties		Total for Western Oregon	
		No Action	Existing	No Action	Existing	No Action	Existing	No Action	Existing	No Action	Existing	No Action	Existing	No Action	Existing	No Action	Existing
Alt. 1 (EFD)	249	+223	(+ 459)	+228	(+ 469)	+ 7	(+ 7)	-16	(-7)	+885	(+1,345)	+875	(+1,839)	+11.7	(+24.5)	+ 15.7	(+ 32.5)
Alt. 2 (Max. Tbr.)	241	+164	(+ 400)	+167	(+ 408)	+ 6	(+ 6)	-16	(-7)	+459	(+1,169)	+635	(+1,599)	+ 8.6	(+21.3)	+ 11.4	(+ 28.3)
Alt. 3 (Def. Har.)	234	+112	(+ 348)	+114	(+ 355)	+5	(+ 5)	+0	(+ 9)	+330	(+1,044)	+ 450	(+1,418)	+ 6.0	(+18.7)	+7.9	(+ 24.8)
Alt. 4 (S.S.D.)	230	+82	(+ 321)	+84	(+ 323)	+4	(+4)	+0	(+ 9)	+242	(+952)	+330	(+1,292)	+4.4	(+17.0)	+5.8	(+22.6)
Alt. 5 (E-W Corr.)	223	+30	(+ 266)	+30	(+ 271)	+ 3	(+ 3)	+1	(+10)	+88	(+802)	+ 120	(+1,088)	+ 1.6	(+14.3)	+2.1	(+ 19.0)
Alt. 6 (No Action)	219	+0	(+ 236)	+0	(+ 241)	+ 0	(+ 0)	+0	(+ 9)	+0	(+714)	+0	(+968)	+0	(+12.7)	+0	(+ 16.9)
Alt. 7 (O.P.A.)	213	-45	(+ 191)	-46	(+ 195)	+ 1	(+ 1)	+0	(+ 9)	-132	(+582)	- 180	(+788)	- 2.4	(+10.3)	-3.2	(+ 13.7)
Alt. 8 (No Herb.)	190	-215	(+20)	-220	(-20)	- 1	(- 1)	+0	(+ 9)	-637	(+77)	- 869	(+99)	-11.5	(+ 1.2)	- 15.3	(+1.5)
Alt. 9 (Eco.)	133	-640	(- 404)	-654	(- 413)	-12	(-12)	+6	(+15)	-1,881	(-1,167)	- 2,569	(-1,601)	-34.2	(-21.4)	- 45.4	(- 28.5)
Alt.10 (Full Eco.)	71	-1,102	(- 866)	-1,125	(- 884)	-18	(-18)	+7	(-16)	-3,224	(-2,230)	- 4,428	(-3,460)	-58.8	(-46.1)	- 78.2	(- 61.3)
Employment and earnings dependent on the No Action (Existing Condition) harvest level of 219 (187.3) MMBF/year		1,630	(1,394)	1,665	(1,424)	--	32	--	(84)	4,940	(4,242)	6,706	(5,753)	88.0	(75.3)	116.6	(95.8)
Average of all sources in region and western Oregon (1978-1981 (Tables 2-19)		19,840	(19,840)	59,830	(59,830)	--	NA	--	(5,791)	152,400	(152,400)	1,058,000	(1,058,000)	2,133	(2,133)	12,250	(12,250)
Percent of Eugene BLM of regional and western Oregon average 1978-1981		8.2%	(7.0%)	2.8%	(2.4%)	–	NA	–	1.5%	3.2%	(2.8%)	.6%	(.5%)	4.1%	(3.5%)	.9%	(.8%)

NA Estimates of county totals are not available

* Change in hunting activity dependent on elk produced on land administered by the Eugene District is for the second decade (see Table 3-13).

Table 3-19 Projected Distribution of O&C Payments from SYUs to Counties by Alternative (average annual disbursements in millions of 1980 dollars. 1984-1993)[1]

O&C Disbursement from SYUs

County	Percent Share O&C Payment	Alt. 1 Max.EFD	Alt. 2 Max.Tbr.	Alt. 3 Def. Har.	Alt. 4 SSD	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Benton	2.81	.85	.82	.80	.78	.76	.74	.72	.65	.45	.24
Clackamas	5.55	1.66	1.62	1.57	1.54	1.50	1.47	1.43	1.28	.89	.48
Columbia	2.06	.62	.60	.58	.57	.56	.55	.53	.47	.33	.18
Coos	5.90	1.78	1.72	1.67	1.64	1.59	1.56	1.52	1.36	.95	.51
Curry	3.65	1.10	1.06	1.03	1.02	.98	.97	.94	.84	.59	.31
Douglas	25.05	7.55	7.30	7.09	6.97	6.76	6.64	6.46	5.76	4.03	2.15
Jackson	15.67	4.72	4.57	4.44	4.36	4.23	4.15	4.04	3.60	2.51	1.35
Josephine	12.08	3.64	3.52	3.42	3.36	3.26	3.20	3.11	2.78	1.94	1.04
Klamath	2.34	.71	.68	.66	.65	.63	.62	.60	.54	.38	.20
Lane	15.27	4.60	4.45	4.32	4.25	4.12	4.05	3.94	3.51	2.46	1.31
Lincoln	.36	.11	.10	.10	.10	.10	.10	.09	.08	.06	.03
Linn	2.64	.80	.77	.75	.73	.71	.70	.68	.61	.42	.23
Marion	1.46	.44	.43	.41	.41	.39	.39	.38	.34	.23	.13
Multnomah	1.09	.33	.32	.31	.30	.29	.29	.28	.25	.18	.09
Polk	2.16	.65	.63	.61	.60	.58	.57	.56	.50	.35	.19
Tillamook	.56	.17	.16	.16	.16	.16	.15	.14	.13	.09	.05
Washington	.63	.19	.18	.18	.18	.17	.17	.16	.14	.10	.05
Yamhill	.72	.22	.21	.20	.20	.19	.19	.19	.17	.11	.06
TOTAL	100.00	30.13	29.16	28.31	27.83	26.98	26.50	25.77	22.99	16.09	8.59

Change in O&C Disbursements Compared to Existing Conditions (187.3 MM bd. ft. per year)

County	Existing Condition	Alt. 1 Max.EFD	Alt. 2 Max.Tbr.	Alt. 3 Def. Har.	Alt. 4 SSD	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Benton	.64	+ .20	+ .18	+ .16	+ .15	+ .12	+ .11	+ .08	+ .01	-.18	-.40
Clackamas	1.26	+ .41	+ .36	+ .31	+ .29	+ .24	+ .21	+ .17	+ .02	-.36	-.78
Columbia	.47	+ .15	+ .13	+ .12	+ .11	+ .09	+ .08	+ .06	+ .00	-.14	-.29
Coos	1.34	+ .44	+ .38	+ .33	+ .30	+ .25	+ .23	+ .18	+ .02	-.39	-.83
Curry	.83	+ .27	+ .24	+ .21	+ .19	+ .16	+ .14	+ .11	+ .01	-.24	-.52
Douglas	5.68	+ 1.87	+ 1.63	+ 1.42	+ 1.29	+ 1.08	+ .96	+ .78	+ .08	-1.65	-3.53
Jackson	3.55	+ 1.17	+ 1.02	+ .89	+ .81	+ .68	+ .60	+ .49	+ .05	-1.03	-2.20
Josephine	2.74	+ .90	+ .78	+ .68	+ .62	+ .52	+ .46	+ .38	+ .04	-.79	-1.70
Klamath	.53	+ .17	+ .15	+ .13	+ .12	+ .10	+ .09	+ .07	+ .01	-.03	-.33
Lane	3.46	+ 1.14	+ .99	+ .86	+ .79	+ .66	+ .59	+ .48	+ .03	-1.00	-2.15
Lincoln	.08	+ .03	+ .02	+ .02	+ .02	+ .02	+ .01	+ .01	+ .00	-.02	-.05
Linn	.60	+ .20	+ .17	+ .15	+ 1.3	+ .11	+ .10	+ .08	+ .00	-.17	-.37
Marion	.33	+ .11	+ .09	+ .08	+ .08	+ .06	+ .06	+ .05	+ .00	-.10	-.20
Multnomah	.25	+ .08	+ .07	+ .06	+ .06	+ .05	+ .04	+ .03	+ .00	-.07	-.14
Polk	.49	+ .16	+ .14	+ .12	+ .11	+ .09	+ .08	+ .07	+ .00	-.14	-.30
Tillamook	.13	+ .04	+ .04	+ .03	+ .03	+ .02	+ .02	+ .02	+ .00	-.04	-.08
Washington	.14	+ .05	+ .04	+ .03	+ .03	+ .03	+ .02	+ .02	+ .00	-.04	-.09
Yamhill	.16	+ .05	+ .05	+ .04	+ .04	+ .03	+ .03	+ .02	+ .00	-.05	-.10
TOTAL	22.66	+ 7.47	+ 6.50	+ 5.65	+ 5.17	+ 4.32	+ 3.84	+ 3.11	+ .30	-6.57	-14.07

Change in O&C Disbursements Compared to the No Action Condition (219 MM bd. ft. per year)

County	No Action Condition	Alt. 1 Max.EFD	Alt. 2 Max.Tbr.	Alt. 3 Def.Har.	Alt. 4 SSD	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
Benton	.74	+ .11	+ .08	+ .06	+ .04	+ .02	+ .00	- .02	- .09	- .29	- .50
Clackamas	1.47	+ .19	+ .15	+ .10	+ .07	+ .03	+ .00	- .04	- .19	- .58	- .99
Columbia	.55	+ .07	+ .05	+ .03	+ .02	+ .01	+ .00	- .02	- .08	- .22	-.37
Coos	1.56	+ .22	+ .16	+ .11	+ .08	+ .03	+ .00	- .04	- .20	- .61	- 1.05
Curry	.97	+ .13	+ .09	+ .06	+ .05	+ .02	+ .00	- .03	- .13	- .38	-.66
Douglas	6.64	+ .91	+ .66	+ .45	+ .33	+ .12	+ .00	- .18	- .88	-2.61	- 4.49
Jackson	4.15	+ .57	+ .42	+ .29	+ .21	+ .08	+ .00	- .11	- .55	-1.64	- 2.80
Josephine	3.20	+ .44	+ .32	+ .22	+ .16	+ .06	+ .00	- .09	- .42	-1.26	- 2.16
Klamath	.62	+ .09	+ .06	+ .04	+ .03	+ .01	+ .00	- .02	- .08	- .24	-.42
Lane	4.05	+ .55	+ .40	+ .27	+ .20	+ .07	+ .00	- .11	- .54	-1.59	- 2.74
Lincoln	.10	+ .01	+ .00	+ .00	+ .00	+ .00	+ .00	- .01	- .02	- .04	-.07
Linn	.70	+ .10	+ .07	+ .05	+ .03	+ .01	+ .00	- .02	- .09	- .28	-.47
Marion	.39	+ .05	+ .04	+ .02	+ .00	+ .00	+ .00	- .01	- .05	- .16	-.26
Multnomah	.29	+ .04	+ .03	+ .02	+ .01	+ .00	+ .00	- .01	- .04	- .11	-.20
Polk	.57	+ .08	+ .06	+ .04	+ .03	+ .01	+ .00	- .01	- .07	- .12	-.38
Tillamook	.15	+ .02	+ .01	+ .01	+ .01	+ .01	+ .00	- .01	- .02	- .06	-.10
Washington	.17	+ .02	+ .01	+ .01	+ .01	+ .00	+ .00	- .01	- .03	- .07	-.12
Yamhill	.19	+ .03	+ .02	+ .01	+ .01	+ .00	+ .00	- .00	- .02	- .08	-.15
TOTAL	26.50	+3.63	+2.66	+1.81	+1.33	+ .48	+ .00	- .73	-3.51	-10.41	-17.91

[1] Sum of the columns may not equal total due to rounding.

Note: Table 2-16 reports that the Bureau of Land Management was paid $242 per thousand bd. ft. for timber harvested from lands administered by the Eugene District during the period 1978-1981. Table 3-19 projects that during the 1984-1993 period the District will continue to receive an average of $242 per thousand bd. ft. harvested and will continue to distribute an average of $121 per thousand bd. ft. to O&C Counties.

Conclusions

As noted in Chapter 2, the regional economy is tightly linked to wood products employment. The currently depressed levels of employment in that sector are related to demand conditions in the national economy. Beneath today's concerns are projections for a dip in wood products production in the 1980's and 1990's due to the availability of timber. Alternatives 1 through 5 increase timber supply from the District and therefore would mitigate dips in employment projected to occur independent of actions by BLM. Alternatives 7 through 10 reduce local timber supply and would intensify the projected downturn.

Social Conditions

The policies by which BLM-administered lands are managed have direct and indirect effects on social conditions and attitudes. Direct impacts may occur when some people's sense of personal well-being is affected by BLM's decisions regarding certain forest management practices (e.g. clearcutting old growth and using herbicides). Indirect effects occur in response to the economic outcome of BLM policies or as opportunities become available or lost. Examples of social effects deriving from economic impacts include the availability of jobs, people's dependence on those jobs, and the availability of public services. Examples of opportunities that may be affected are those for recreational and subsistence activities. All of these impacts, whether direct or indirect, may affect people's lifestyle and community stability.

Social Dimensions of Timber Industry Employment

The direct economic impacts of the various alternatives on timber industry employment have been discussed in the section on economic conditions. The social effects depend on where the affected jobs are located and how important those jobs are to the workers, the mills and communities. Potential impacts would be identified more accurately if data were available to determine each mill's past, present and future estimates of dependence on BLM timber. Other helpful data would include residence patterns and people's perceptions of their ability to commute to new jobs, or to move to areas with jobs, or to change their type of work in response to additional jobs being available (as with Alternatives 1, 2, 3, 4 and 5) or fewer jobs being available (as with Alternatives 7, 8, 9 and 10).

Table 3-20 provides an example that estimates the impacts to timber processing jobs that the different alternatives would have on the communities receiving Eugene District timber in the years 1975-77.

The nature of the timber industry work force also affects the potential social impacts from changes in employment. The more senior workers tend to be less mobile, more of them are married, they live in small communities and they have lower levels of unemployment. The younger workers are more likely to be single, better educated and they live in larger communities. Since lumber and wood product firms tend to hire and fire on the basis of job seniority, many of these younger workers have developed alternative job skills and when laid off, can be absorbed into other occupations near their urban homes.

Table 3-20 Example of the Number of Timber Processing Jobs Potentially Attributable to the Eugene District Alternative Harvest Levels

Alternative Number		1	2	3	4	5	6	7	8	9	10
Percent Different From No Action		+13.7	+10.0	+6.8	+5.0	+1.8	---	-2.7	-13.2	-39.3	-67.6
Community Receiving Eugene District Timber (1975-77)[1]	Number (and percent) of Each Community's Timber Processing Jobs Based on Eugene District Timber---(1975-77 Average Volume) [1]										
Douglas County											
Reedsport/Gardner	5.1(0.1)	5.8	5.6	5.4	5.4	5.2	---	5.0	4.4	3.1	1.7
Lane County											
Coburg	64.6(64.6)	73.5	71.1	68.9	67.8	65.8	---	62.9	56.1	39.2	21.0
Cottage Grove	135.9(14.6)	154.5	149.5	145.1	142.7	138.3	---	132.2	118.0	82.5	44.0
Creswell	13.9(6.8)	15.8	15.3	14.8	14.6	14.2	---	13.5	12.1	8.4	4.5
Culp Creek	145.5(28.0)	165.4	160.1	155.4	152.8	148.1	---	141.6	126.3	88.3	47.1
Eugene/Springfield	425.1(7.9)	483.3	467.6	454.0	446.4	432.8	---	413.6	369.0	258.0	137.7
Junction City	9.1(4.1)	10.3	10.0	9.7	9.6	9.3	---	8.9	7.9	5.5	2.9
Mapleton	22.5(4.4)	25.6	24.6	24.0	23.6	22.9	---	21.9	*19.5	13.7	7.3
Noti	29.5(24.6)	33.5	32.5	31.5	31.0	30.0	---	28.7	25.6	17.9	9.6
Linn County											
Lebanon	1.9(0.1)	2.2	2.1	2.0	2.0	1.9	---	1.8	1.6	1.2	0.6
Sweet Home	54.8(6.1)	62.3	60.3	58.5	57.5	55.8	---	53.3	47.6	33.3	17.8
TOTAL	908.0(7.6)	1,032.2	998.7	969.3	953.4	924.3		883.4	788.1	551.1	294.2

[1] From Table 2-25.

The older, more stable work force is about 73 percent of all wood product workers (Stevens 1976). This suggests that Alternatives 1 through 8 would affect younger workers only. Alternatives 9 and 10 would disrupt the core work force and would be expected to have significant adverse social effects.

Another factor influencing potential social effects is the fact that many wood product industry workers commute to their jobs between different urban and rural settings.

Significant social effects would be felt if Alternatives 9 or 10 were followed. With the other alternatives, only a relatively small number of people would be affected in any community. In the Eugene-Springfield area, where Alternatives 1 and 8 would affect nearly 60 jobs in the example, significant social impacts would not be expected because that number is barely one percent of the timber processing work force. A change of 60 jobs (see Table 3-20 which shows 425 jobs with no action, 483 in Alternative 1, and 369 in Alternative 8) in any of the other communities receiving Eugene District timber would have substantial social effects, but none of the smaller communities are that dependent on Eugene District timber. The sources of timber are well diversified for each community, and the social effects of employment resulting from changes in the Eugene District timber management program would be relatively diffuse.

Public Services

Revenues paid to the 18 O&C counties affect the availability and accessibility of public services. O&C revenue payments to the counties are unrestricted, so the services they provide for vary.

The relative significance of the alternatives can be obtained by considering that O&C payments made up 23.2 percent of the Lane County revenues and 16.0 percent of the Linn County revenues in FY 1977-78 (Table 2-20); and that the Eugene District timber receipts accounted for 17.5 percent of the O&C pool. The Eugene District thus accounts for about 4.1 percent of the Lane County revenues and about 2.8 percent of Linn County revenues. The contribution of Eugene District timber receipts to the other counties can be calculated by multiplying 17.5 percent times the figures in the last column of Table 2-20.

Alternatives 1 through 8 would cause changes of less than 0.5 percent in the revenues in Lane or Linn Counties and therefore, would not be expected to have significant social effects. Alternatives 9 and 10 could reduce Lane County revenues by 1.6 percent and 2.8 percent, and Linn County revenues by 1.1 percent and 1.9 percent. The alternatives would also affect the other O&C counties to an extent related to the percentage of total county revenues from O&C receipts.

Attitudes and Opinions

Actions by BLM that increase opportunities for work, subsistence and recreational activities would have beneficial social effects, while actions that reduce these opportunities would have adverse social effects. Actions that divide and polarize a community have adverse social effects. An action may be perceived as beneficial by wood product workers but detrimental by people not involved in forestry employment; or an action that unites a small community may have divisive effects in a larger community.

Harris, 1979 indicates that many people want more of all forest uses, except for off-road vehicles. Unfortunately, this survey does not show whether the same or different people favor more or less of the various uses, or whether people would make trade-offs to have less of some uses in order to have more of other uses. However, the survey results do suggest that alternatives that strongly emphasize one or two resource uses would satisfy fewer people than an alternative that ensures diverse forest uses and opportunities.

Considering the controversy surrounding the use of herbicides, all of the alternatives can be expected to affect some people's attitudes in this issue. Alternative 8 would satisfy those who oppose or fear the use of herbicides, but would probably disappoint people who believe that herbicide use ensures more wood products jobs. Another series of potential impacts of Alternative 8 is that there would be more opportunities for manual labor at relatively low pay, and that there would be an increase of interpersonal conflicts in communities where forest development workers interact with loggers and wood products workers.

Community Stability

Social effects on community stability may occur if BLM's timber management program:

- Causes enough changes in employment to disrupt normal patterns of life in communities where the jobs are and/or where people live;
- Affects the opportunities for a variety of recreational activities or
- Leads to attitudes or opinions that increase interpersonal conflict or divisiveness within a community.

By examining Table 3-20 it is possible to identify the type of community that would be most susceptible to social effects related to employment changes (e.g., one like Culp Creek, which has a moderate number of jobs and a fairly large dependence on Eugene District timber). A community like Coburg, with a greater dependence on Eugene District timber, is less susceptible to social impacts because the number of jobs to be affected is so small. The social impacts in any community would not be expected to be significant except under Alternatives 9 and 10.

Local community disruptions as a result of differing opinions may be minor because the people holding the opposing opinions may not live in the same communities. Alternatives 9 and 10 would probably be opposed by some people in small rural communities that are dependent on timber-based jobs and would be supported by some people who live in urban areas, in Oregon and out-of-state, and have jobs unrelated to the timber industry. Alternatives 1 and 2 would be supported in the same rural communities but opposed by people who primarily value and use the non-timber resources of the forests.

The use of herbicides may be an issue that will affect local community cohesion, no matter which alternative is implemented, because opinions of both support and opposition appear to be widespread.

In conclusion, the alternatives that incorporate some trade-offs to maintain diverse forest values and uses would have relatively more unsettling social effects in all communities, as people debate the issues. The alternatives that emphasize particular uses, largely to the exclusion of others, are likely to unify some small communities but to be strongly divisive in others.

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

Comments on the draft environmental statement were requested from the following:

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce
- National Marine Fisheries Service

Department of Defense
- U.S. Army Corps of Engineers

Department of Energy
- Region X

Department of the Interior
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Mines
- Bureau of Reclamation

Small Business Administration
Environmental Protection Agency

State and Local Government

Oregon State Clearinghouse
Oregon Regional Clearinghouses
Lane Council of Governments
Umpqua Regional Council of Governments
District 4 Council ofGovernments
Oregon State Historic Preservation Officer
Boards of County Commissioners
- Benton County
- Linn County
- Lane County
- Douglas County

Interest Groups (partial listing)

American Forest Institute
Associated Oregon Industries
Association of O&C Counties
Cascade Holistic Economic Consultants
Friends of the Earth
Industrial Forestry Association
Izaak Walton League
Natural Resource Defense Council
National Wildlife Federation
Northwest Environmental Defense Center
Northwest Timber Association
Oregon Environmental Council
Oregon Natural Heritage Program
Oregon Student Public Interest Research Group
Oregon Wilderness Coalition
Sierra Club
Southern Oregon Citizens Against Toxic Sprays
Southern Oregon Resource Alliance
Southern Oregon Timber Industries Association
The Wilderness Society
Western Forest Industries Association
Wildlife Management Institute

Copies of this draft environmental impact statement will be available for public inspection at the following BLM offices:

Washington Office of Public Affairs
18th and C Streets
Washington, D.C. 20240
Phone (202) 343-5717

Oregon State Public Affairs Office
825 N.E. Multnomah
P.O. Box 2965
Portland, Oregon 97208
Phone (503) 231-6277

Eugene District Office
1255 Pearl St.
Eugene, Oregon 97401
(503) 687-6651

Reading copies will be placed in the following libraries: Portland State University, Portand; Oregon State University, Corvallis; University of Oregon, Eugene; Lane Community College, Eugene; Umpqua Community College, Roseburg; and Linn-Benton Community College, Albany; and public libraries in Salem, Eugene, Springfield and Cottage Grove.

An open house workship and a public meeting will be held in Eugene, Oregon, on the adequacy, completeness and accuracy of this environmental impact statement.

Details as to dates, time and place will be published in local news sources.

LIST OF PREPARERS

While individuals have primary responsibility for preparing sections of an EIS, the document is an interdisciplinary team effort. In addition, internal review of the document occurs throughout preparation. Specialists at the District and State Office levels of the Bureau both review the analysis and supply information. Contributions by individual preparers may be subject to revision by other BLM specialists and by management during the internal review process.

Name	Primary Responsibility	Discipline	Related Professional Experience
Dick Bonn	Team Leader	Biologist	4-1/2 years BLM (Supervisory Environmental Specialist) Portland, Oreg. 11 years SCS 2-1/2 years (Biologist) Watershed & River basin, Columbus, Ohio. 2-1/2 years (Biologist) Watersheds Richmond, VA. 4 years (Biologist & Recreation) Albany, Oreg. 2 years (Soil Conservationist) Harrisburg, Oreg.
D. F. Buck, Jr.	Air, Soil, Water, Climate, Geology, Human Health	Soil Scientist	5 years BLM (Soil Scientist, Environmental Protection Specialist)
Phillip D. Havens	Fisheries & Wildlife	Wildlife Biology	18 years (Wildlife Biologist)
Jeanne Johnson	Editor	Administrative Secretary	6 years BLM(Secretary, Editorial Assistant)
R. Michael Martin	Socioeconomics	Economics	6 years (Economist)
Joseph Ross	Recreation, Cultural Resources, Wilderness, Areas of Critical Environmental concern, Special Areas, Visual Resources and Energy.	Recreation	8 years (Forestry Technician, Biological Information Specialist, Outdoor Recreation Planner)
R. Gregg Simmons	Description of the Proposed Action and Alternatives, Vegetation	Forest Management	8 years BLM (Forester) 5 years Eugene, Oreg. 2 year Portland, Oreg.
Eugene District Personnel Contributing Substantial Input			
James McLaughlin		Soil Scientist	3 years BLM 12 years U.S. Forest Service 6 years University of California Agricultural Experiment Station 1 year Soil Conservation Service
Jon Strandjord	Planning coordination, information supply, document review	Forest Management	8 years BLM (Planning and Environmental Coordination) 2 years FPC (Environmental Specialist) 1 year USFS (Forester)
Charle L. Thomas		Wildlife Biologist	5 years BLM Wildlife Biologist 15 years BLM Forester
Frank Wagner		Wildlife Biologist	6 years BLM Wildlife Biologist 1 year BLM Forestry Technician

APPENDICES

A - Results of Scoping
B - Management Criteria to be Used in Developing Plans for BLM-Administered Forest Lands in Western Oregon
C - Development of the Proposed Action and Alternatives
D - Predicted Alteration of Wildlife Habitat on all Forest Lands on the EIS Area
E - Alternation of Wildlife Habitat on BLM-Administered Forest Land

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT

District Office
P. O. Box 10226
Eugene, Oregon 97440

MAY 2 6 1982

Results of EIS Scoping Meeting - April 5, 1982

Dear Citizen:

On April 5, 1982, a public scoping meeting was held in Eugene to obtain comments to help BLM define appropriate alternatives and issues to be addressed in the environmental impact statement (EIS) on the Eugene District timber management plan.

Participants at the meeting suggested 14 different alternatives for consideration in the EIS. Letters in response to the invitation to participate in EIS scoping suggested some of the same alternatives plus one not brought up at the meeting. These alternatives were discussed the following day with the members of the former District Advisory Council who assisted in analysis of them and suggested an alternative not previously proposed by the public.

Based on public comments, recommendations of former District Advisory Council members, and BLM analysis, we have concluded that the EIS should analyze eight alternatives in addition to the Preferred Alternative. Some of these selected alternatives combine the major features of two or more of the 16 suggested potential alternatives. The selected alternatives in addition to the Preferred Alternative are:

--Maximum Timber Production
--Maximum Timber Production with Even Flow Departure
--Deferred Harvest
--East-West Corridor
--Ecosystem
--Maximum Ecosystem, with Withdrawal of Old-Growth
--No Use of Herbicides and No Credit for Fertilization and Genetics
--No Action

The following is a summary description of all 16 alternatives suggested and our analysis of their usefulness and relevance to the EIS process.

1. Maximum (Sustainable) Timber Production. This alternative contains the timber management elements of Alternative I in the booklet summarizing the preferred land use alternative and other alternatives considered. All commercial forest lands would be allocated for intensive timber production except those managed to protect bald eagles or existing developments such as recreation sites, and those withdrawn (TPCC) because of uncertainty of reforestation or soil instability (fragile sites). This establishes one end of a range of reasonable land-use allocation alternatives for analysis in the EIS.

2. Maximum Timber Production with Even Flow Departure. This alternative would depart from even flow for two decades, on the land use base described above. It addresses a relevant timber management issue. Any departure would, however, lead to a subsequent (after two decades) decline in harvest below the even-flow level. To make this alternative reasonable, the design of it will limit such declines to 5 MMBF below the even-flow level.

3. Maximum Timber Production From All Lands. This alternative would differ from Alternative 1 by making available for timber harvest all lands (TPCC) withdrawn due to reforestation problems or fragile sites. Since present technology does not show us that such a harvest would be sustainable this is not considered to be a realistic alternative. Some persons consider it a useful reference point, however, so the EIS will display the annual harvest level which could be obtained from inclusion of this land in the timber harvest base, although no further analysis of the option will be made.

4. Deferred Harvest. This alternative would protect from harvest during the plan decade all lands that would be protected under the preferred alternative. However, the allowable cut would be computed as though no land were to be managed on an extended rotation to maintain old-growth forest values for wildlife habitat diversity. This alternative is useful to analyze as it would provide a high level of timber production in the coming decade while preserving about seven percent of the commercial forest base in old-growth stands through a decade of advanced research on old-growth ecology.

5. East-West Corridor. This alternative would provide an east-west linkage of diversified wildlife habitat between National Forests in the Coast Range and Cascade Range, and the proposed systems of wildlife habitat corrdors in the adjacent BLM Coos Bay and Roseburg Districts. This corridor would establish a regional system of habitat diversity for spotted owl preservation and for other wildlife purposes. The Eugene District provides the only opportunity for such a linkage in northern and central Oregon. This corridor would contain a variety of seral stages distributed so as to prevent isolation of specialized habitats and to preserve opportunities for genetic interchange. About 15,000 acres of District land would be managed on an extended rotation of 350 years to create this corridor. Although this alternative was not directly derived from public scoping, it was explained at the April 5 meeting and found to be useful for analysis by the former Advisory Council.

6. Ecosystem Management. This alternative, which contains the timber management elements of Alternative 3 in the booklet summarizing the preferred and other land-use alternatives, would emphasize the protection and enhancement of natural values, while providing for a moderate level of timber production. About 25 percent of the District would be managed on extended rotations of 350 years to provide a high level of wildlife diversity on District lands. About 17 percent of the District would be withdrawn to protect riparian areas. This alternative would provide a high level of protection for visual resources and a wide variety of recreational opportunities, including an allocation for primitive recreation in the Windy Peak Area. It is a useful land-use allocation alternative to analyze.

7. Extended Rotation of 200-250 Years. This concept could be applied as a substitute for the 350-year extended rotation element of the preferred or other alternatives. It does not, however, provide the older seral stages which make the extended rotation approach so valuable to wildlife. Neither would it provide much additional timber volume for harvest. Since it would not help much to meet any primary objectives in a different way than other alternatives, analysis of it is not considered useful.

8. Maximum Ecosystem Management. This alternative, which contains the timber management elements of Alternative 4 in the booklet summarizing the preferred and other land-use alternatives, establishes the other end of the range of reasonable land-use allocation alternatives. It would provide maximum protection and enhancement of wildlife habitat, water quality, visual resources and other natural values. About 45 percent of the District would be managed on an extended rotation of 350 years to provide wildlife habitat for old-growth dependent species. About 17 percent of the District would be withdrawn to protect riparian areas. This alternative would also provide a high level of protection for visual resources and a wide variety of recreational opportunities, including an allocation for primitive recreation in the Windy Peak Area.

9. Withdraw Old Growth. This alternative, raised in a letter, but not at the public meeting, would call for withdrawal from all timber harvest of timber stands above a specified age. It would have many similarities of impacts with Alternative 8 above, and essentially identical objectives. Accordingly, it is considered most useful to combine it with Alternative 8, withdrawing all stands currently over 160 years old.

10. No Herbicides. This alternative would be the same as the proposed action in timber base and management practices except that herbicides would not be used to control grass, brush and hard wood species growing in competition with commercial tree species. This would eliminate herbicide treatments for the control of competing vegetation prior to reforestation (site preparation), during establishment (stocking maintenance) and after young stands become established (release). This addresses a major timber management issue and therefore is relevant to analyze in the EIS. For useful comparison with the proposed action, vegetation control by biological, mechanical or manual methods would be prescribed to the same dollar level of investment as used for herbicides and other vegetation management practices in the proposed action.

11. No Credit (Allowable Cut Effect) for Fertilization, Genetically Improved Trees, or Herbicides. This alternative would include the stated intensive management practices but the allowable cut computation would not take credit for growth increases expected to result. The use of herbicides or alternative vegetation management practices is an integral part of the Bureau's reforestation program, and no separate allowable cut effect occurs from them. The allowable cut credits for fertilization and genetically improved stock, however, have been controversial. Elimination of these credits can be included with the No Herbicide alternative to address a relevant mix of compatible issues.

12. No Credit (Allowable Cut Effect) for any Intensive Management Practice. This alternative would eliminate the credit in allowable cut computation for all intensive management practices including thinning. Significantly less people at the public meeting supported its inclusion in the EIS, than supported inclusion of Alternative 11 above. To address the allowable cut effect issue in two separate alternatives does not seem warranted.

13. Selective Cut, All-Age Management. This alternative would preclude clear-cutting and substitute all-age management and selective harvesting. Discussion with the former Advisory Council members brought out objections because of infeasibility of maintaining Douglas-fir stands on a large portion of the District under such management. While harvest under the Preferred Alternative or any alternative would include selective cut, all age management where appropriate, it is not reasonable or prudent to analyze this approach as the only available management scheme. In addition, the repeated entry of timber stands required by such an approach to management would result in similar impacts as would clear-cut management, on the significant soil, water, fish and wildlife resources. Only visual impacts would be markedly less. For the overriding reason of non-sustainability, however, it was concluded that this alternative is not relevant to analyze in the EIS.

14. Require Analysis of Economic Impacts For Each Timber Sale. This would not be a clearly distinct alternative, in either the allocation of land, or the intensity of timber management, or the rate of harvest. Thus, there is no practical way to analyze its environmental impacts as different from those of other alternatives.

15. Adjust Sale Levels To Demand. To define in advance the sale levels that would result from such an alternative, and thus analyze their impacts, we would have to be able to predict expected demand levels for the decade. There is no forecast consensus on which a defensible prediction could be based. This alternative is essentially beyond the scope of a regional EIS such as this one.

16. Deferred Harvest Combined With East-West Corridor, No Herbicides and Adjustment of Sale Levels to Demand. This alternative would include the elements of Alternatives 4, 5, 10 and 15 previously discussed. It is impractical specifically because of the infeasibility of definition of Alternative 15. In addition, only two participants in the scoping meeting favored its inclusion for analysis in the EIS. Only one other suggested alternative received as little support from the participants. The elements of this suggestion, other than adjustment of sale levels to demand, will be included in other EIS alternatives. Thus they will be available to the decisionmakers for incorporation in the final decision.

The public, through the EIS scoping meeting and letters, did an excellent job of defining a number of issues they believed the EIS should address. The EIS analysis will not be limited to these issues, but will include all of them unless some cannot be effectively addressed in the context of the impacts of the timber management program, or cannot be effectively addressed in the time allotted to complete the EIS.

The suggested issues are:

1. Firewood availability
2. Budget constraints
3. Benefit/cost analysis without allowable cut effect
4. Impacts of plan for decade
5. Wildlife--including old-growth research
6. Future values of wildlands
7. Job equivalency of nonmarket goods
8. Alternative jobs
9. Wildlife: risk assessment
10. Compliance with House Memorial No. 1 and Forest Practices for Oregon
11. Fisheries
12. Visual
13. Cultural
14. Botanical
15. Tradeoffs of timber production
16. Windy Peak
17. Employment of dependent communities
18. O&C receipts distribution by alternatives, by county, by dollars
19. Alternatives to protect spotted owls
20. Long-term site productivity
21. Siuslaw Wild and Scenic River status
22. Quality of old-growth
23. Snag management

The audience was also asked for its preference on meetings which could be held during the public comment period on the draft EIS. There was no support for a formal hearing. The majority favored an open house workshop at the District Office, but there was also some support for an informal meeting instead of, or in addition to, the workshop. After discussion with the former District Advisory Council members, we concluded that we would have an open house workshop and later public meeting. The latter would be held under the auspices of the District Advisory Council which we expect to be rechartered by then. Details on dates will be announced with release of the draft EIS.

Sincerely yours,

Dwight H. Hutton

District Manager

APPENDIX B

Management Criteria to be Used in Developing Plans for BLM Administered Forest Lands in Western Oregon

1. The primary emphasis is to provide an optimum and nondeclining yield of wood products so as to enhance the economic stability of local communities and industries while providing for other forest values as required by law. A uniform flow of timber sale offerings is to be maintained. Optimum production is defined as approaching, meeting, or exceeding the State Forestry Plan for Oregon goals.

2. Limit or exclude timber harvest on suitable land for the protection of high public recreational value at sites comparable to those at Loon Lake, Shotgun Creek, Fisherman Bend and Hyatt Lake.

3. Protect and maintain scenic quality in areas of important visual value. Constrained management (e.g., extended rotations) may be applied to protect scenic values in Visual Resource Management Classes I, II, and III when such protection cannot be fully met by mitigating measures such as partial cutting methods.

4. Maintain water quality at Federal and State standards by incorporating mitigating measures in forest management.

5. Management of other non-timber forest values required by law will be provided to the extent possible by allocation of noncommercial or nonsuitable forest land. If non-timber management needs are not met by this initial allocation, mitigating measures may be applied to the timber management program. Only if the first two steps are not adequate will management constraints, such as extended rotations, be applied to timber production. Finally, as the last resort, consideration may be given to withdraw lands from the allowable cut base. Allocation of such lands, however, shall only be accomplished after a thorough analysis of the social and economic impacts of the reduced or excluded production on the local communities and industries. Management measures for other non-timber forest resources include:

a. Protection of wetlands, including riparian zones.

b. Maintenance of specifically identified habitat for species on the Federal Threatened and Endangered list and species being formally considered for protective listing by the U. S. Fish and Wildlife Service as provided for in existing law.

6. Additional commercial forest lands suitable for intensive timber production shall not be allocated for withdrawal from the allowable cut base or for constrained timber production (e.g., extended rotations) unless such action is found necessary to protect future options for maintenance of a seral stage distribution assuring continued high timber productivity. In such cases, the minimum incremental allocation will be made for the allowable cut (10 year) planning period that is needed beyond the protection afforded by the allocations made under 5, 5a, 5b above. This allocation will be reviewed in depth no later than 10 years after implementation and will be reviewed anytime sooner as conditions change or as new information becomes available. During this period, seral stage management provides diversity of habitat as a benefit from good timber management.

7. Commercial forest lands that are capable of sustained timber production (suitable lands) shall be managed for timber and wood products to the extent provided by law. Allowable cut declaration levels will be based on the use of intensive management practices considered to be operational within a 20 year planning horizon and considered to be economically viable (i.e., B/C ratio > 1.0 at current published OMB interest values). The use of intensive management practices will be maximized to the extent feasible.

The Seral Stage Distribution Concept

Applying the seven criteria (above) in planning produced the seral stage distribution concept.

Background

The mid-age and old-growth stands remaining today are the result of complex interactions between plants and animals over time. Evidence points towards the simultaneous evolution of these plants and animals. Yet, the exact functioning and purpose of many of these interactions have not yet been studied in depth. For example, the mechanisms for nitrogen fixation have only been identified within the past decade. Additionally, there are indications that mycorrhizal inoculation by rodents may be critical to plantation establishment and survival in some instances (Franklin et al. 1981). There are many unknowns regarding which portions of this interacting web, if any, must be replicated by management if long-term timber production is to be maintained at high levels. What is known, however, is that the timber management program would liquidate the remaining old growth stands in a relatively short time if unconstrained.

Specific Criteria for Implementing Seral Stage Distribution in Western Oregon.

1. Each district is to identify one large block of mid-age and/or old-growth timber, preferrably on a 50 percent-50 percent basis, 300- to 500-acres in size, in each seed zone within each 500' elevational band.

Seed zones are accepted as generally encompassing a geographic area within which the factors affecting reforestation and subsequent growth are relatively homogenous. They also form the best currently available geographic orientation for a system of old-growth reservations. The 300- to 500-acre size is generally recognized as being adequate to maintain old growth interior species if attention is given to configuration, probable wind firmness, etc. While a 50-50 mix of mid-age and old growth is preferred, in many cases this may not be possible in which case preference should be given to maintaining the old-growth seral stage.

2. Each district is to identify, where possible, connecting corridors between large blocks consisting of 50- to 100-acre small blocks spaced at 1 to 1-1/2 mile intervals containing mid-age and/or old growth on a 50-50 basis. Where a linkage via corridor is not feasible because of the isolation of a particular large block, consideration should be given to providing such isolated large blocks with a distribution of surrounding satellite small blocks.

Small blocks are intended to prevent genetic isolation of the smaller birds and animals that may prove to be critical to long-term timber production in a particular area. The 50- to 100-acre size and the 1 to 1-1/2 mile distribution are judgments as to what would comprise a probably effective interim measure.

Results of Applying Specific Criteria

Figure B-1 indicates the seed zones which cover the five western Oregon district boundaries. There are portions of 28 seed zones which occur on BLM-administered lands. However, sufficient acres of old growth to meet the criteria only occur within 14 of the seed zones. Table B-1 shows the elevation intervals where large blocks have been identified in each seed zone, and the district that is expected to provide protection.

Table B-1 Tree Seed Zones by Elevation in Western Oregon

Zone	Elevation	District
053	1,500 -2,000	Salem
061	1,000-1,500	Salem
061	1,500-2,000	Salem
061	2,000-2,500	Salem
062	500-1,000	Coos Bay
062	500-1,000	Coos Bay
062	1,000-1,500	Eugene
062	1,000-1,500	Coos Bay
062	1,500-2,000	Coos Bay
071	500-1,000	Coos Bay
071	500-1,000	Coos Bay
071	1,000-1,500	Coos Bay
071	1,000-1,500	Coos Bay
071	1,500-2,000	Coos Bay
071	1,500-2,000	Coos Bay
071	2,000-2,500	Coos Bay
072	500-1,000	Coos Bay
072	500-1,000	Coos Bay
072	1,000-1,500	Coos Bay
072	1,000-1,500	Coos Bay
072	1,500-2,000	Coos Bay
072	1,500-2,000	Coos Bay
072	2,000-2,500	Coos Bay
072	2,000-2,500	Coos Bay
072	2,500-3,000	Coos Bay
072	2,500-3,000	Coos Bay
251	1,500-2,000	Salem
252	500-1,000	Coos Bay
252	500-1,000	Roseburg
252	500-1,000	Eugene
252	1,000-1,500	Eugene
252	1,000-1,500	Eugene
252	1,000-1,500	Roseburg
252	1,500-2,000	Salem
270	500-1,000	Roseburg
270	1,000-1,500	Roseburg
270	1,000-1,500	Roseburg
270	1,500-2,000	Roseburg
270	2,000-2,500	Roseburg
270	2,500-3,000	Medford
452	1,500-2,000	Salem
452	3,000-3,500	Salem
452	3,500-4,000	Salem
461	1,000-1,500	Salem
461	1,500-2,000	Salem
461	2,000-2,500	Salem
461	2,500-3,000	Salem
461	3,000-3,500	Salem
461	3,500-4,000	Salem
462	1,500-2,000	Salem
481	1,500-2,000	Eugene
481	2,000-2,500	Eugene
481	2,500-3,000	Eugene
491	500-1,000	Roseburg
491	1,000-1,500	Roseburg
491	1,500-2,000	Roseburg
491	2,000-2,500	Roseburg
491	2,500-3,000	Roseburg
491	3,000-3,500	Roseburg
491	3,500-4,000	Roseburg
492	1,000-1,500	Roseburg
492	1,500-2,000	Roseburg
492	2,000-2,500	Roseburg
492	2,500-3,000	Roseburg
492	3,000-3,500	Roseburg
492	3,500-4,000	Medford

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Salem
Newport
Albany
Eugene
Florence
North Bend
Coos Bay
Roseburg
Medford

OCEAN
PACIFIC
SALEM
EUGENE
BAY
ROSEBURG
COOS
CRESCENT

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FIGURE B-1

WESTERN OREGON TREE SEED ZONES

Scale 1:1,000,000

LEGEND

261 Seed Zones Numbers

Seed Zones Boundary

Appendix C

DEVELOPMENT OF THE PROPOSED ACTION AND ALTERNATIVES

Defining the proposed action is the last phase of the planning process prior to preparation of the EIS. Alternatives to the proposed action are identified during the scoping phase of the environmental analysis process. Each alternative analyzed in this EIS contains a mix of variables encompassing a range of choices for decisionmakers as required by the CEQ Regulations (40 CFR 1502.2(2)).

In determination of a sustained yield allowable cut, the primary variables are land classification, acres allocated to timber production and enhancement of growth assumed from specific development practices or treatments. Following in the order of occurrence are brief descriptions of the inventories and processes employed to determine the allowable cut level for the proposed action and each alternative.

Land Classification and Inventory

Timber Production Capability Classification

The Timber Production Capability Classification (TPCC) is an intensive inventory process initiated in 1972 to categorize all public land administered by BLM in western Oregon based upon the land's physical and biological capacity to produce timber. TPCC was conducted in accordance with Oregon Manual Supplement 5250.

The TPCC identified 286,249 acres of commercial forest land which could be managed on a sustained yield basis. Approximately 21,555 acres of the commercial forest land were determined to be incapable of undergoing harvest without significant site degradation. These lands, excluded from the timber production base, were placed in this category when it was judged that economically reasonable technology was not available to mitigate such degradation. The remainder of the SYUs' 8,943 acres was determined to be non-forest or non-commercial forest lands. If new data become available from intensive on-site analysis or improvements occur in technology, the classifications may be altered.

Operations Inventory

For BLM to carry out the timber management program effectively, specific information as to the location and current condition of the various forest types within the land base must be available to the managers. This is accomplished through the Operations Inventory (OI) in accordance with procedures contained in the Operations Inventory Handbook (STORMS).

The OI is an intensive inventory providing forest type maps which show the location and classification of each homogeneous forest type island. OI record cards list acreage, silvicultural needs and opportunities for application of forest management practices on each type island. Operations Inventory thus provides a basis for establishing priorities for treatment based on stand conditions and productivity.

1978 Forest Reinventory

A reinventory of commercial forest land in the SYUs was completed in 1978 employing procedures for extensive inventory jointly developed by the USFS and BLM (USDA, FS 1976). The reinventory uses the same basic inventory design as was used for determination of the present allowable cut, but with further refinement to include stratification of commercial forest land based on information obtained from the OI and TPCC. Statistical analysis indicates the sample mean volume per acre in the Eugene SYUs is within 6 percent of the true mean volume per acre at one standard deviation.

The reinventory indicates a forest distribution as displayed in Table C-1. Age classes range from non-stocked to 500 years.

Table C-1 Existing Acres by Age Class on All Timber Management Lands

Age Class	Acres	Age Class	Acres
Non-stocked	13,031	210	1,694
1-5	21,239	220	1,135
10	30,112	230	3,896
20	38,601	240	1,135
30	36,654	250	6,711
40	34,256	260	1,444
50	14,522	280	1,158
60	5,896	300	8,230
70	7,425	310	2,567
80	7,686	340	1,444
90	9,522	350	4,353
100	5,252	370	405
110	8,822	380	948
120	9,099	400	4,192
130	3,519	440	1,135
140	4,861	450	948
150	1,932	460	1,135
160	1,527	470	412
170	3,405	500	2,361
180	2,083		
200	3,122	Total	307,869

Source: 1978 inventory for Eugene SYUs.

Other Resource Inventories

Inventories were conducted to identify and categorize specific capability and potential of resources other than timber. Recreation planners applied the BLM's Recreation Information System, an inventory approach for determining inherent

potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the SYUs for visual and esthetic considerations. A review and compilation of known cultural resource data (Class I cultural resource inventory) has been completed. Wildlife biologists classified habitat types within the District and performed field inventories on selected species including northern spotted owl and bald eagle. Fisheries biologists conducted surveys of streams within the district. Botanical surveys for threatened and endangered plants were initiated for the Eugene District in April 1978 and are updated yearly.

Criteria for Selecting the Original Proposed Action (Alternative 7)

The following criteria were used by the District Manager in developing the Original Proposed Action:

- -Meet the long-term objective to attain a high level of sustained yield timber production to satisfy regional and national needs.
- -Minimize soil loss caused by both management activities and uncontrolled activities (e.g., off-road vehicles).
- -Contribute to the improvement or maintenance of water quality in streams, rivers and municipal watersheds, compared to current conditions.
- -Minimize sediment reaching the stream and water temperature changes that occur as a result of management activities.
- -Minimize impacts on air quality in residential areas.
- -Provide for developed and dispersed recreational opportunities to meet demands related to BLM-administered lands.
- -Provide for maintaining the visual quality of the forest landscape in areas of high sensitivity.
- -Protect, or improve and develop fish spawning, rearing and migration habitat.
- -Protect important wildlife habitat.
- -Protect or enhance habitat of threatened or endangered plant and animal species.
- -Provide for scientific and educational study through such programs as Research Natural Areas.
- -Allow minerals exploration and development while protecting other resource values.
- -Allow adequate land allocations for communication sites, access development and designation of right-of-way corridors while protecting other resource values.
- -Provide local economic stability through high levels of local employment and other use opportunities available on lands administered by BLM.
- -Provide for a high level of contribution to local public revenues from resources and activities available on public lands.
- -Demonstrate consistency with State planning goals (Land Conservation and Development Commission), acknowledged local comprehensive plans, and officially approved local resource related plans, programs and policies.
- -Demonstrate consistency with other Federal resource-related plans, programs and policies. (Provide coordinated approach to regional issues and projects or proposals crossing administrative lines.)

Land Use Allocation

During the development of the proposed land use allocations, broad land use alternatives (MFP Alternatives) were identified and reviewed by the District to assess their effects. These MFP alternatives were circulated for public review and comment in 1981. Scoping (see Appendix A) of the EIS led to the conclusion that four of these land use allocation alternatives (some slightly modified) were important enough to analyze in depth. EIS Alternatives 2, 7, 9 and 10 were adapted from those alternatives.

Resource protection varies by alternative relative to the mixture of land use allocations (Table C-2) and management features prescribed. Table C-3 shows acreage allocations, by resource, of the MFP withdrawals and constrained timber production bases.

When final MFP timber management decisions are made, they will form the management prescriptions. Similarily, actions for other resources, e.g., habitat management plans, will be within the MFP guidelines.

Table C-2 Land Use Allocation Proposed for the EIS Alternatives In Acres

	Alternatives									
	1	2	3	4	5	6[1]	7	8	9	10
	Max./EFD	Max. Tbr.	Def. Har.	S.S.D.	E-W Cor.	No Action	O.P.A.	No Herb.	Eco.	Full Eco.
No Planned Timber Harvest										
Non-Commercial Forest Land	340	340	340	340	340	9,392	340	340	340	340
Non-Forest Lands [2]	8,603	8,603	8,603	8,603	8,603	12,365	8,603	8,603	8,603	8,603
Fragile Site Withdrawals	13,523	13,523	13,523	13,523	13,523	0	13,523	13,523	13,523	13,523
Reforestation Withdrawals	8,032	8,032	8,032	8,032	8,032	0	8,032	8,032	8,032	8,032
MFP Withdrawals [3]	210	210	9,558	14,058	9,558	295	9,558	9,558	36,670	71,124
Sub-total	30,708	30,708	40,056	44,556	40,056	22,052	40,056	40,056	67,168	101,622
Timber Production Base Acreage										
Intensive Timber Production Base	286,039	286,039	276,331	271,831	265,416	294,695	253,085	253,085	135,026	58,511
Constrained Timber Production Base										
VRM (MHA-120)	0	0	360	360	360	4	360	360	29,410	55,458
Wildlife (MHA-350)	0	0	0	0	10,915	4	23,246	23,246	85,143	101,156
Total Timber Production Base	286,039	286,039	276,691	272,191	276,691	294,695	276,691	276,691	249,579	215,125
Total SYUs Acres	316,747	316,747	316,747	316,747	316,747	316,747	316,747	316,747	316,747	316,747

[1] Land use allocations for Alternative 6 (No Action) resulted from the land classification instructions used in the 1970 planning process.
[2] Existing recreation sites are contained in this category.
[3] These are commercial forest lands which would be withdrawn from the timber production base for other resource considerations. See Table C-3 for the identified resource and acres allocated.
[4] A multiple use factor, applied to the intensive timber base, was used during the 1970 cut calculation process, consisting of an approximate 3 percent reduction in yield on 54,720 acres for visual and wildlife considerations.

Table C-3 Acreage Allocation by Resource

Resource Considerations in Acres	Alt. 1 Max/EFD	Alt. 2 Max. Tbr.	Alt. 3 Def. Har.	Alt. 4 S.S.D.	Alt. 5 E-W Cor.	Alt. 6 No Action	Alt. 7 O.P.A.	Alt. 8 No Herb.	Alt. 9 Eco.	Alt. 10 Full Eco.
MFP WITHDRAWALS										
Botanical	0	0	0	513	0	0	0	0	513	513
Cultural	40	40	0	0	0	0	0	0	40	40
Research Natural Areas	0	0	780	780	780	0	780	780	780	780
Wildlife:										
Bald Eagle	170	170	103	103	103	0	103	103	103	103
Old Growth Blocks	0	0	0	3,987	0	0	0	0	0	44,107
Riparian Areas	0	0	8,675	8,675	8,675	295	8,675	8,675	35,234	25,581[2]
CONSTRAINED TIMBER PRODUCTION BASE[1]										
Visual Resource Management	0	0	360	360	360	42,660	360	360	29,410	55,458
Wildlife:						12,060[3]				
Bald Eagle	0	0	0	0	40	0	850	850	1,500	400
Northern Spotted Owl	0	0	0	0	10,915	0	17,000	17,000	38,000	9,000
Roosevelt Elk Cover	0	0	0	0	1,800	0	4,000	4,000	13,000	5,000
Black-tailed Deer Cover	0	0	0	0	5,000	0	10,000	10,000	23,000	16,000
Cavity Users	0	0	0	0	10,900	0	19,400	19,400	46,000	13,800
Raptors	0	0	0	0	10,900	0	22,250	22,250	61,300	67,700
Large Carnivors and Fur Bearers	0	0	0	0	10,900	0	21,300	21,300	59,500	57,300

[1] Acres are not additive due to overlap.
[2] Actual acres of riparian zones are the same as in Alternative 9, however, consist of old-growth timber and included in old-growth blocks.
[3] During the 1970 planning process, no break down by group was estimated. Only a total figure for wildlife was given.

Allowable Cut Computation

Forest Simulation Model

A computerized forest simulation model (SIMIX) is used to determine the highest sustainable allowable cut for each alternative. SIMIX calculates the allowable cut associated with the stated forest management plan. It can maximize an even-flow level of cut for some specific management regime, or a series of cut levels may be specified for as many as the first 10 decades followed by an even-flow level for the remainder of the projected period (40 decades). This lengthy projection period is not an attempt at a 400-year plan. It is used only to assure that the condition of no planned reduction in allowable cut can be met.

The clearcut option of SIMIX was utilized since clearcut is the predominant harvest method in all alternatives. For accuracy in measuring lumber and plywood production, the allowable cut is computed and projected into the future on the basis of cubic feet.

SIMIX computes the harvest level based on present inventory and projected growth resulting from the application of certain management practices (mortality salvage, precommercial and commercial thinning, commercial thinning only, forest genetics and final harvest cuts). Another treatment, fertilization, is included in conjunction with one or more of the above treatments. SIMIX must be told treatments, times of application and the number of acres to be treated. No rotation age is set; instead, a minimum cutting age constraint is specified. SIMIX is not designed to handle economic values or costs, and it does not seek out alternative schedules or strategies.

The model, designed for forests under an even-aged system of management, produces output data by decades for each age and treatment class and summarizes them numerically and graphically. These data include level of growing stock, annual growth, acreage by silvicultural practices and volume by harvesting practice. Consequently, it permits alternative plans to be evaluated on the basis of their respective production levels and fiscal requirements

and serves as a basis for programming personnel and funds for the alternative selected. In effect, a management plan is developed that schedules the production from commercial thinning, mortality salvage and final harvest operations and also the acreages for such treatments as reforestation and precommercial thinning. The model is geared to the proposed policies but is flexible to the extent that other regulatory policies can be applied in its use.

The Allowable Cut Effect (ACE)

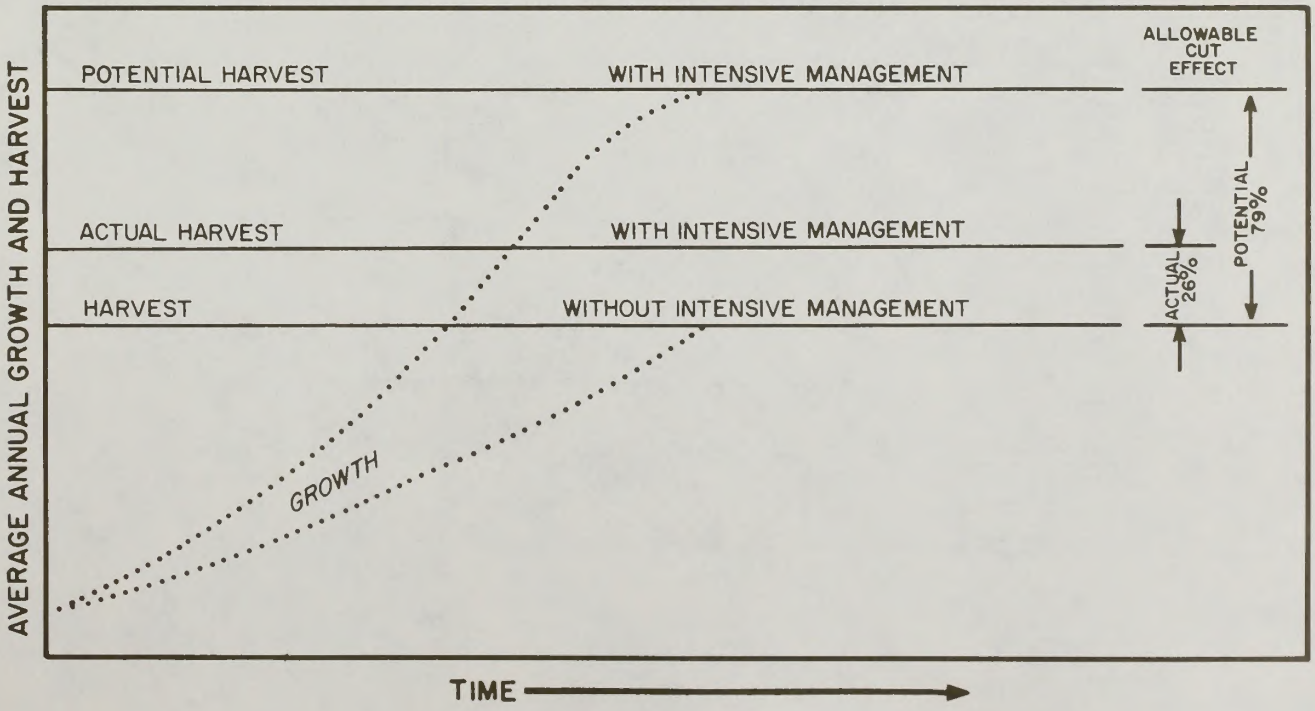
A forest that is composed primarily of old-growth timber and recently cut-over stands exhibits a relatively low average annual growth. This results from slow or negative growth of the old stands and the fact that growth is not measurable (in end-product terms) in the young stands until they reach 20 or 30 years of age. Such a forest is in transition from an unmanaged to a managed or regulated state. In the classical sense, the regulated state is achieved when average annual harvest and growth are in equalibrium. At this point, maximum yield on a sustainable basis is reached. To compute an allowable cut on a forest in the transition state using this criteria would be extremely conservative and greatly lengthen the time until the regulated state was achieved. The BLM uses an alternative approach which is to project growth into the future based upon assumptions about management levels and to utilize excess harvest age timber to bridge the time gap until the ultimate growth level is achieved. This process of taking credit now for future growth increases expected to result from management has been termed the "Allowable Cut Effect" (ACE).

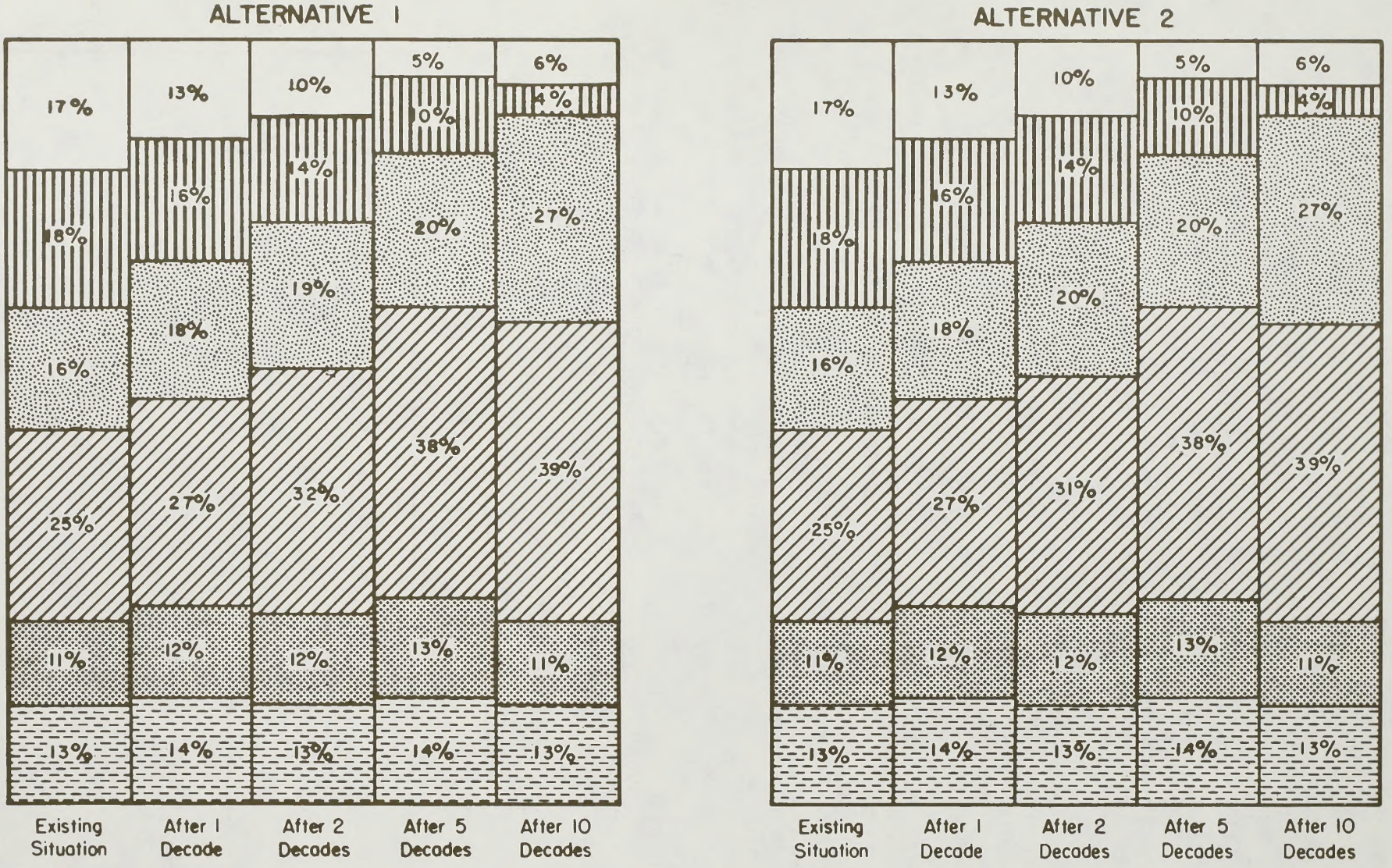
Figure C-1 illustrates this process in the context of conditions found in the SYUs, before land use allocations were made to other resource activities.

This forest is in the early to middle transition stage and, as the recent inventory found, has a relatively low average annual growth rate. An initial computation was made that assumed no intensive management practices were performed. Under this scheme, stands were projected to grow in a fashion similar to normal unmanaged forests. The lower growth curve in Figure C-1 shows the average annual growth path projected from these assumptions. When tested on the allowable cut model, it was determined that sufficient harvest age timber was available to bridge the gap until a regulated state was achieved.

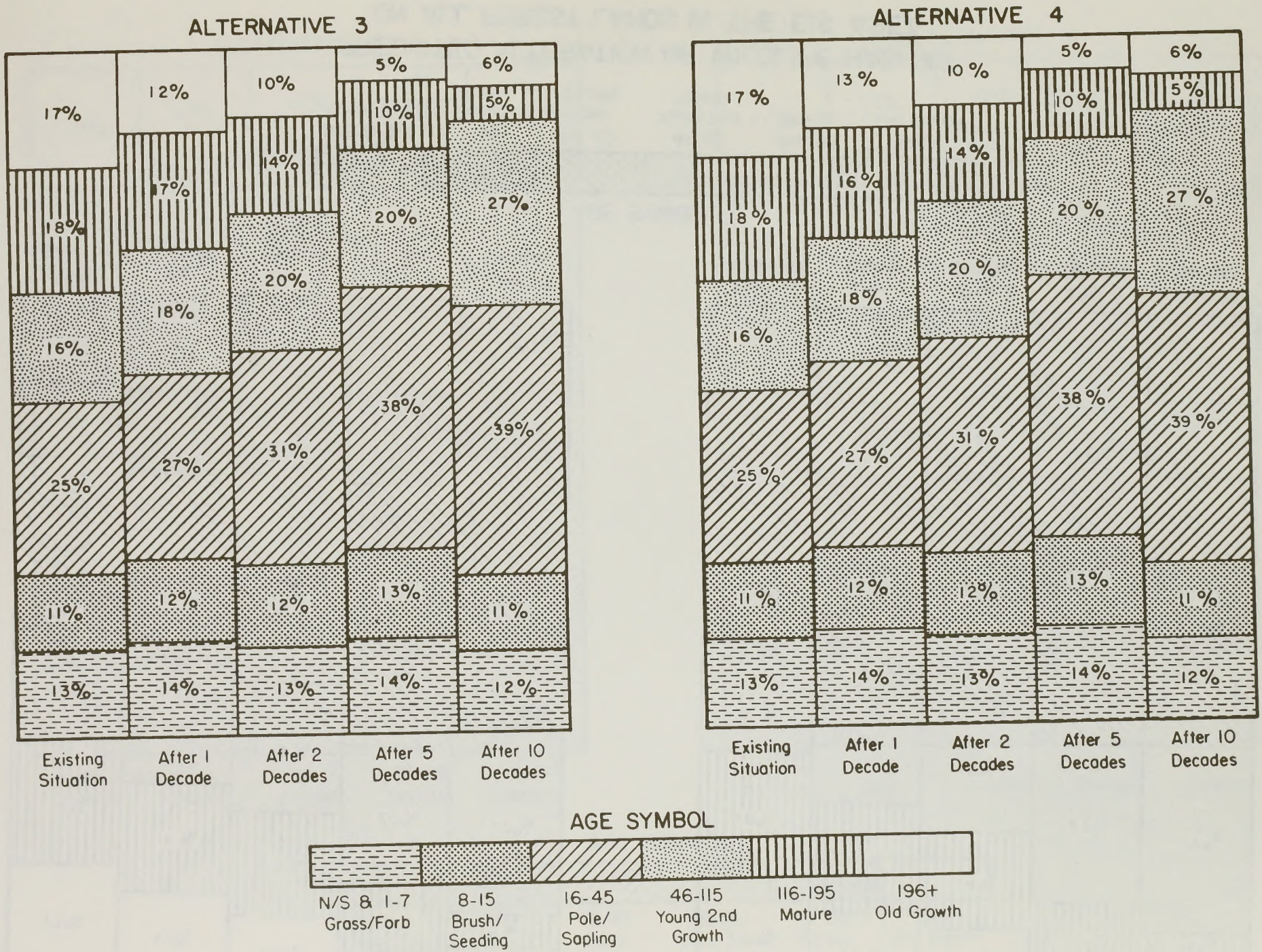
Next, a high level of management was assumed. Practices (see Chapter 1, Forest Management Treatments and Design Elements) such as genetic improvement, precommercial and commercial thinning, fertilization and mortality salvage were used in projecting yield functions. The basis for most of these projections was the DFIT model. The higher growth curve in Figure C-1 shows the average annual growth path resulting from the intensive management assumptions. When tested on the allowable cut model, it was determined that there was only enough harvest age timber available to take credit for a portion of the expected future growth increases. For full ACE credit to apply, there must be enough harvestable timber to bridge the previously mentioned time gap. Since this was not the case in the Eugene SYUs, the allowable cut effect applied was limited to about 33 percent of the projected potential allowable cut effect. To set a cut level higher than the "actual" would cause a drop in future cut levels, a violation of Bureau policy. Essentially, the limited volume of standing harvest age timber has built a conservative factor into the computation process.

FIGURE C-1
ALLOWABLE CUT EFFECT





PREDICTED ALTERATION OF WILDLIFE HABITAT ON ALL FOREST LANDS IN THE EIS AREA



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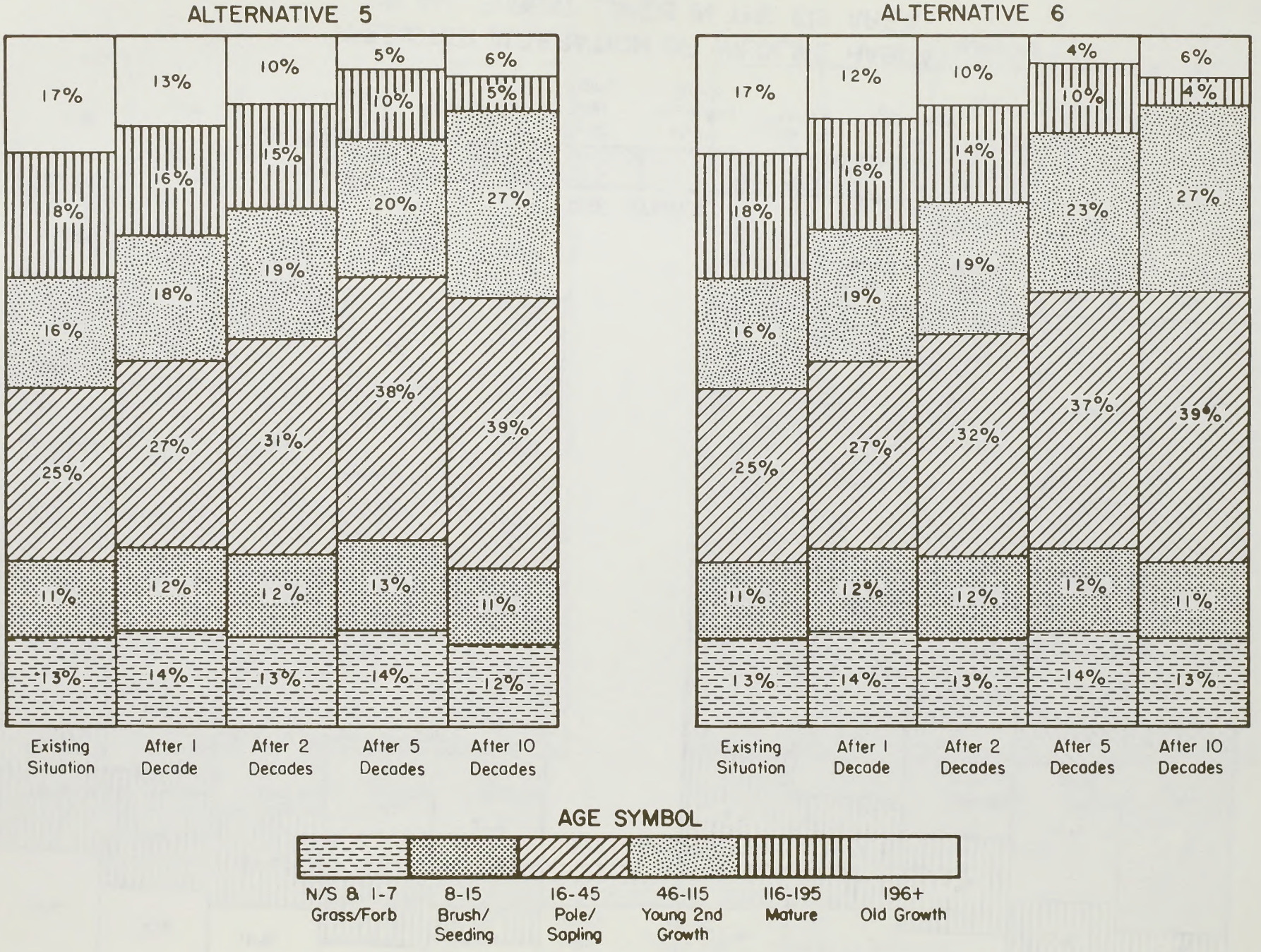
ON ALL FOREST LANDS IN THE EIS AREA



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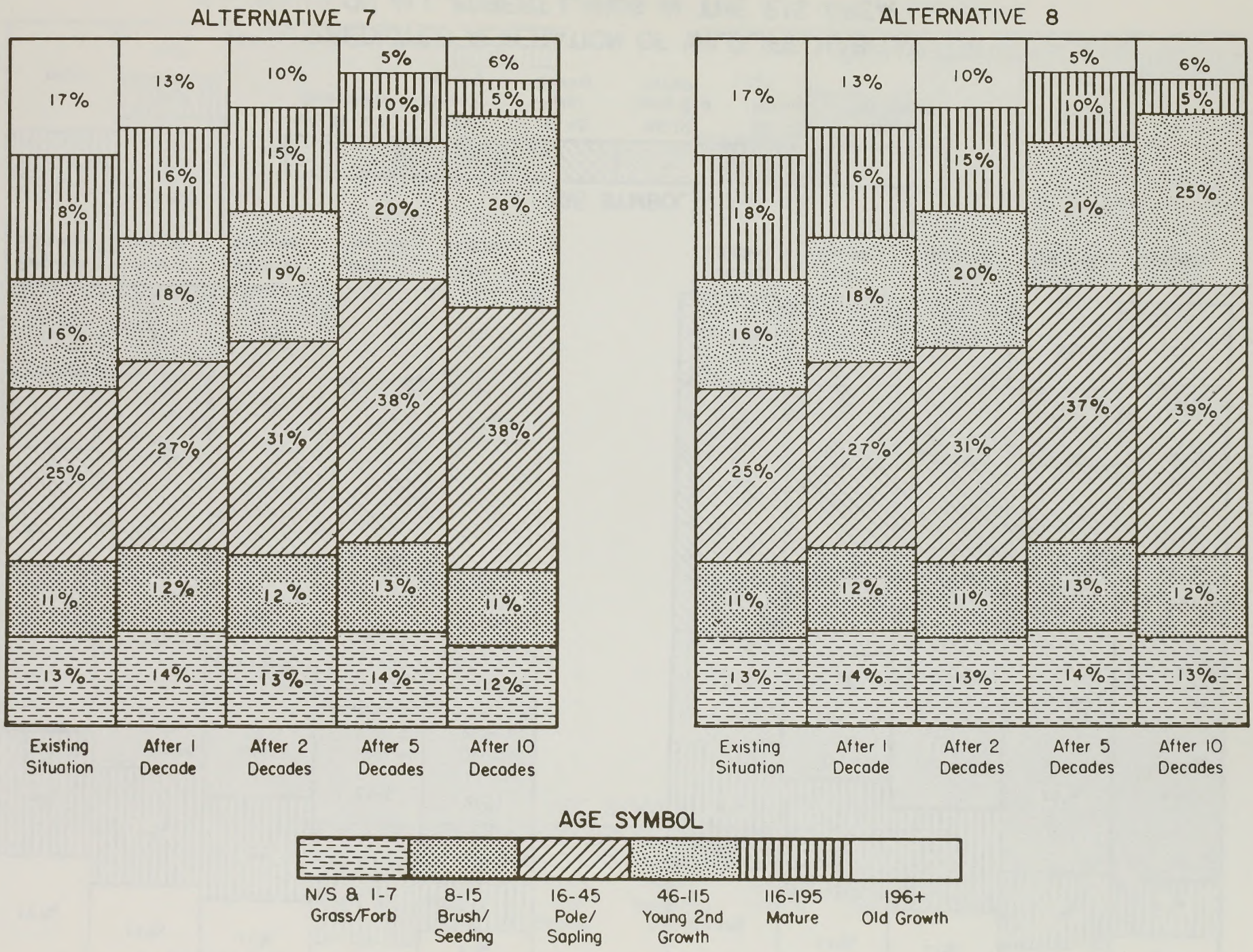

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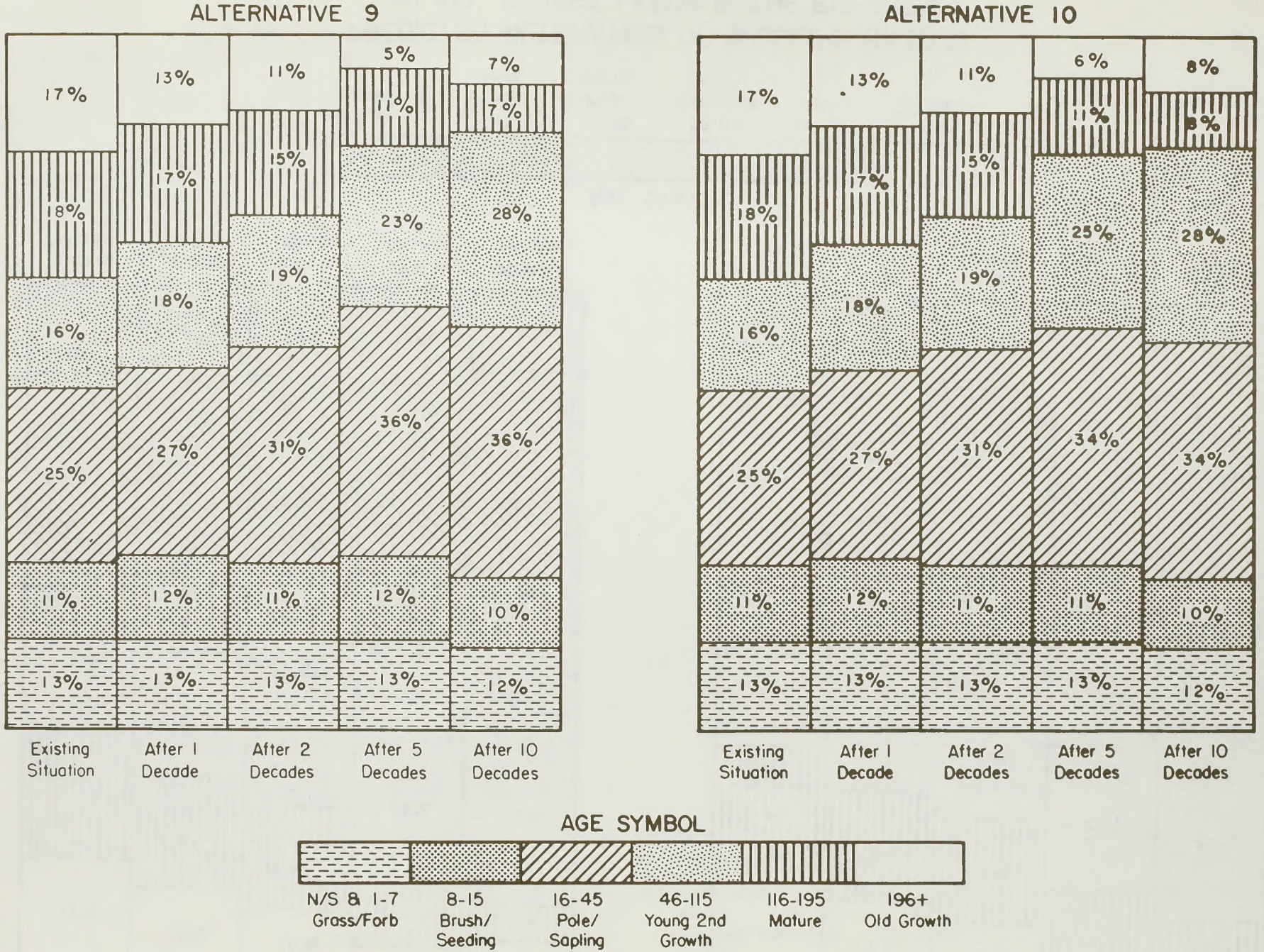
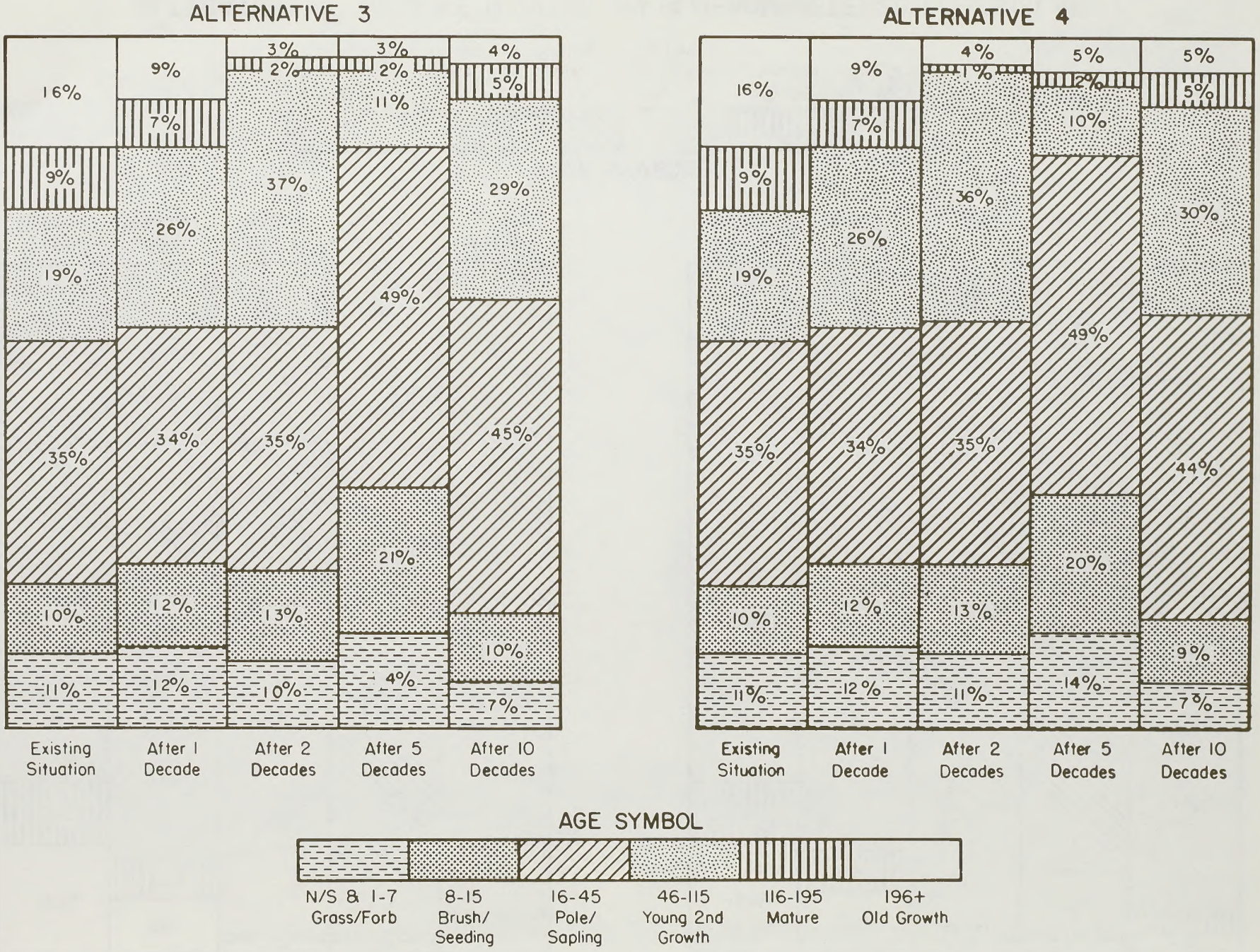
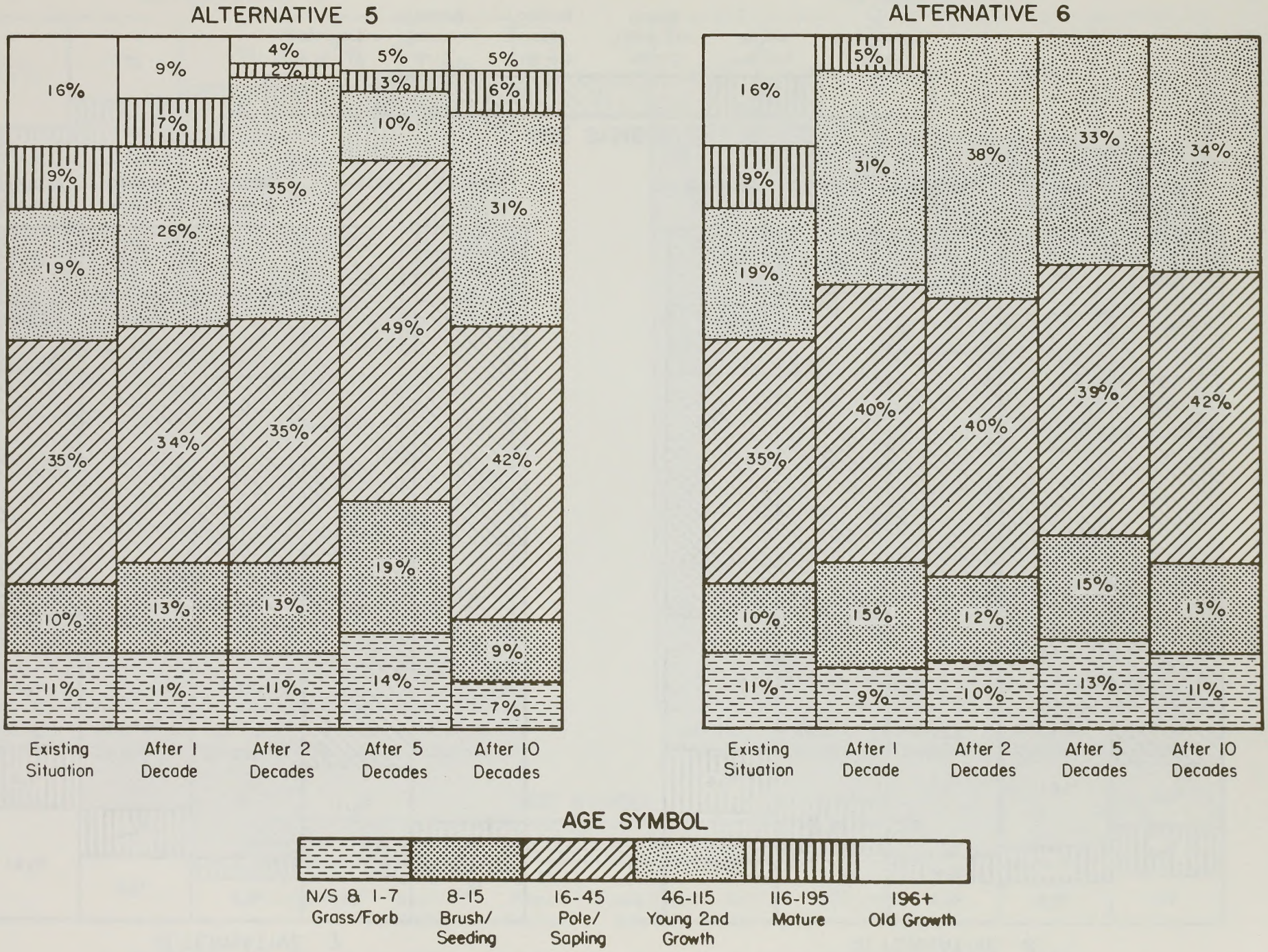


PREDICTED ALTERATION OF WILDLIFE HABITAT
ON ALL FOREST LANDS IN THE EIS AREA

ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



ALTERATION OF WILDLIFE HABITAT ON BLM–ADMINISTERED FOREST LAND



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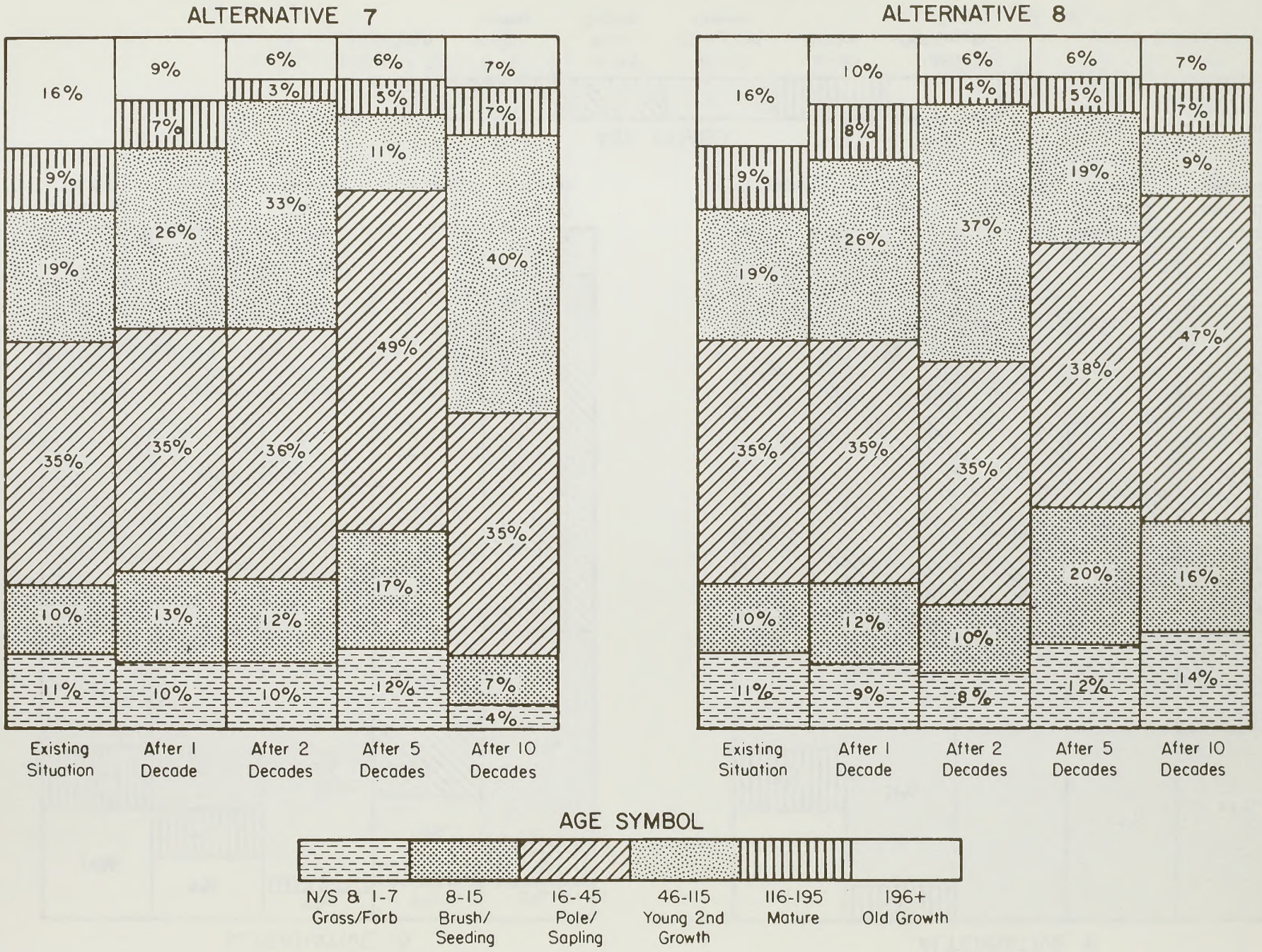
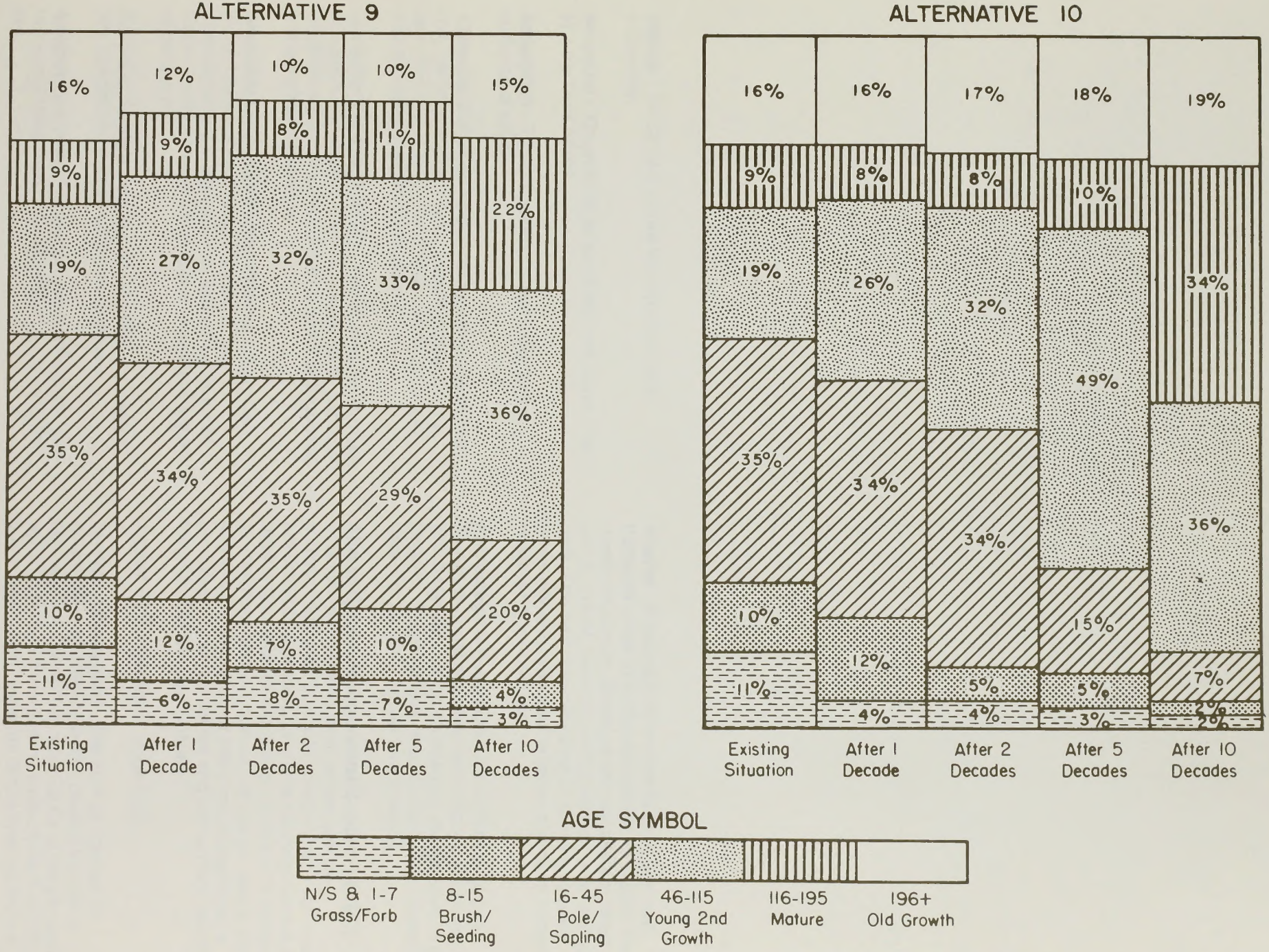


ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND

GLOSSARY OF TERMS

Absorb - To be held within the structure of a substance.

Acre-foot - The volume of water that will cover 1 acre to a depth of 1 foot.

Adsorption - The adhesion of substances to the surfaces of solids.

Allowable Cut - The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Allowable Cut Effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

Allowable Cut Determination Process - A process which deals with the steps involved in the development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

Ambient - Surrounding, on all sides; for air, refers to any unconfined portion of the atmosphere.

Anadromous Fish - Fish which migrate from the sea to breed in fresh water. Their offspring return to the sea.

Aquifer - A geologic formation or structure that transmits water in sufficient quantity to supply the needs for a water development; usually saturated sands, gravel, fractures, and cavernous and vesicular rock. The term water-bearing is sometimes used synonymously with aquifer when a stratum furnishes water for a specific use.

Archeological Resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data and all other relevant information.

Area of Critical Environmental Concern (ACEC) - An area within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA Sec. 103(a)).

Aspect - The direction a slope faces.

Average Employment - The sum of number of employees, reported monthly, divided by twelve; because employment is reported for all employees working during the reporting week of each month, it is a modest under-estimate of full-time equivalent employment.

Background - That portion of an area being viewed beyond the foreground-middleground (3 to 5) miles to a maximum of about 15 miles from a travel route, use area, or other observer position.

Background Levels - Amounts of pollutants present from natural sources and from human disturbances which have reached equilibrium.

Basal Area - The area of the cross-section of a tree stem near its base, generally at breast height and inclusive of bark. It is usually expressed as square feet per acre.

Bedload - The sediment that moves by sliding, rolling or bounding, on or very near, the streambed.

Biome - The largest land community unit (plant and animal) which is convenient to recognize.

Board Foot - A unit of solid wood, 1-foot square and 1-inch thick.

British Thermal Unit (BTU) - A unit of heat equal to 252 calories; quantity of heat needed to raise the temperature of one pound of water from 62 F. to 63 F.

Broadcast Burning - Intentional burning in which fire is intended to spread over all of a specific area. It may or may not qualify as prescribed burning.

Bucking - Cutting trees into log lengths.

Buffer Strip - A protective area adjacent to an area requiring special attention or protection.

Bureau Planning System - A process used in the BLM to establish land use allocations, constraints, and objectives for various categories of public land use.

Characteristic Landscape - The established landscape within a physiographic province. The term does not necessarily mean "naturalistic character." It could refer to farm lands, timber lands or other landscapes which exhibit both physiographic and land use similarities.

Clearcutting - A method of timber harvesting in which all trees, merchantable or unmerchantable, are cut from an area.

Commercial Forest Land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

Commercial Thinning - Partial cuttings made in merchantable stands (40-70 years old) in order to stimulate the growth of remaining trees and increase total yield from the stand.

Community Income Effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

Constrained Timber Production Base - Base Acreage managed for timber production at a lesser intensity in consideration for other resource management objectives, i.e., minimum harvest age of 350 years for wildlife habitat (see Intensive Timber Production Base).

Contrast - The effect of a striking difference in the form, line, color or texture of the landscape features within the area being viewed.

Contrast Rating System - A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature (land and water form, vegetation and structures).

Coos Bay Wagon Road (CBWR) Lands - Public lands granted to the Southern Oregon Company and subsequently reconveyed to the United States.

Critical Habitat - That habitat considered by the Secretary of the Interior to be necessary to the normal needs or survival and recovery of listed Threatened or Endangered Species. It may also include habitat not currently occupied into which a listed species could expand.

Cull - A tree or log which is rejected because it does not meet certain specifications.

Cultural Resources - Those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including both prehistoric and historic remains, represent a part of the continuum of events from the earliest evidences of man to the present day.

Debris Avalanche - Fast moving failures of shallow, generally cohesionless soils on steep slopes over an impermeable failure surface.

Debris Torrent - A very fluid mass of soil, rock and vegetative debris that moves rapidly down steep, narrow stream channels.

Discharge - Rate of flow of a fluid, the volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second (cfs), million gallons per day, gallons per minute, or cubic meters per second.

Distance Zone - The area that can be seen as foreground-middleground, background, or seldom-seen.

Ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system.

Environmental Assessment (EA) - A systematic environmental analysis of site-specific BLM activities used to determine whether such activities have a significant affect on the quality of the human environment and whether a formal environmental impact statement is required.

Environmental Impact Statement (EIS) - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Epiphytic - A plant growing on another plant.

Erosion (soil) - Removal of soil from its place of origin to a point of deposition other than a stream channel.

Even Flow - Maintaining a relatively constant undiminishing supply of timber from year to year for the planning cycle.

Fauna - All the animals in a given area.

Final Harvest Cut - Constitutes removal of a mature stand, either through clear cutting, the final stage of a shelterwood regime, or overstory removal.

Flora - All the plants in a given area.

Forbs - Herbaceous plants; most often used pertaining to herbaceous plants eaten by wildlife.

Foreground-middleground - The area visible from a travel route, use area, or other observer position to a distance not exceeding 5 miles. The outer boundary of this zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. Vegetation is apparent only in patterns or outline.

Forest Canopy - The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Forest Land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

Forest Management Program - Includes timber activity plan and all forest resource related program activity plans.

Forest Type Island - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement and condition to be distinguishable from vegetation on adjoining areas.

Groundwater - Subsurface water in the zone of saturation.

Growing Stock - The amount of standing, green timber retained to produce forest products; also known as forest capital.

Habitat - The environment in which an organism occurs.

High-lead Logging - A cable yarding system in which lead blocks are hung on a spar or tower to provide lift to the front end of logs giving partial suspension.

Historic Resources - All evidences of human activity that date from historic (i.e., recorded history) periods. These resources include documentary data (i.e., written records, archival material, photographs, maps, etc.), sites, artifacts, environmental data, and all other relevant information. Also included are locations where documented historical events took place, even though no physical evidence of the events remain other than the setting. Historic resources are cultural resources and may be considered archeological resources when archeological work is involved in their identification and interpretation.

Igneous Rock - Rock formed from the cooling and solidification of molten rock.

Infiltration (soil) - Downward entry of water into the soil.

Intensive Forest Management Lands - All commercial forest land that is part of the timber production base for allowable cut calculation in the Douglas and South Umpqua Sustained Yield Units.

Intensive Timber Production Base - Base Acreage intensively managed for timber production using a 50 year minimum harvest age in the allowable cut computation.

Intermediate Cuttings - Any removal of merchantable trees from a stand prior to the final harvest cutting, i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Landscape Features - The land and water form, vegetation, and structures which compose the characteristic landscape.

Leach - Usually refers to the movement of chemicals through soil by water; may also refer to movement of herbicides out of leaves, stems or roots into the air or soil.

Log Flows - Destinations of harvested timber by origin. Origins used herein are management units and counties or county groupings; destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

Lumber and Wood Products, except Furniture - Defined by the Office of Management and Budget and the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

Mass Failure - See Mass Movement.

Mass Movement - Downslope movement of soil and rock caused by gravity; may be slow (creep) or rapid (landslide, debris avalanche).

Metamorphic Rock - Rock formed from preexisting rocks but changed by heat and/or pressure to rock with new physical, chemical and mineralogical properties.

Microclimate - The climatic condition of a small area modified from the general climatic conditions by local differences in elevation or exposure.

Minimum Harvest Age - The lowest age of a stand to be scheduled for final harvest.

Mixing Height - The height above the ground through which vertical mixing of air is relatively vigorous.

Mortality Salvage - See sanitation/salvage cutting.

Multiple Use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

National Natural Landmark - Areas designated by the Secretary of Interior which contain representative examples of the nation's natural history, including terrestrial communities, aquatic communities, landforms, geological features or habitats of native plant and animal species, possessing national significance in illustrating or interpreting the nation's natural heritage.

National Register of Historic Places - The official list, established by the Historic Preservation Act of 1966, of the Nation's cultural resources worthy of preservation. The Register lists archeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, State, or national significance by State and/or Federal agencies and approved by the National Register staff. The Register is maintained by the National Park Service.

Natural Levels - Amount of pollutants present from natural sources without human disturbances which have reached equilibrium.

Non-commercial Forest Land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year from commercial species, or land which is capable of producing only non-commercial tree species.

Non-degradation Policy - Use of the highest and best practicable treatment and/or control of wastes, activities and flows to maintain water quality at the highest possible levels.

Non-forest Land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Non-point Source Pollution - Pollution caused by the introduction of materials from diffuse sources (e.g., sediment, nutrients), or from a natural or manmade alteration in the stream system.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Old growth - A forest containing many large trees with large snags and numerous large, down logs. There is a multi-layered canopy of several species. Some of the older trees are beginning to show signs of decadence. Small openings are scattered throughout the forest. In western Oregon, forests begin to have old growth characteristics at about 200 years.

Old-Growth Dependent - An animal species so adapted that it can exist only in old-growth forests.

Operations Inventory - An intensive forest inventory which provides managers with information showing the location, acreage, silvicultural needs, and mortality-salvage or thinning needs within each section of public land.

Paleontology - A science dealing with the life of past geological periods as known from fossil remains.

Partial Cutting - Tree removal other than by clearcutting.

Particulates - Finely divided solid or liquid particles in the air or in an emission; includes dust, smoke fumes, mist, spray and fog.

Peak Flow - The highest amount of stream or river flow occurring in a year or for a single storm event.

Perched Water Table - The surface of a local zone of saturation held above the main body of groundwater by an an impermeable layer or stratum, usually clay, and separated by the main body of ground water by an unsaturated zone.

Permeability (soil) - The quality of a soil horizon that enables water or air to move through it; may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

Personal Income - The income received by all individuals in the economy from all sources; made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

Phytoplankton - Suspended, floating or weakly swimming microscopic aquatic plants.

Plankton - Organisms of relatively small size, mostly microcscopic, that either have relatively small powers of locomotion or drift in the water subject to the action of waves and currents.

Plant Community - An association of plants of various species found growing together in different areas with similar site characteristics.

Plantation Release - Any action taken on an established commercial timber stand to control stand composition and promote dominance and/or growth of suitable tree species. Treatments may include mechanical or manual slashing of undesirable brush and tree species, herbicide, biological, or a combination of methods. Forest fertilization is not considered a **Release** treatment.

Plantation Stocking Maintenance - Any vegetation management action taken on an unestablished stand to promote the survival and establishment of suitable trees. Treatments may include using biological, mechanical, or manual weeding, mulching, herbicide or a combination of methods.

Precommercial Thinning - Partial cuttings made in immature stands (10-25 years) in order to stimulate the growth of remaining trees by making available increased soil moisture, thereby increasing total yield from the stand.

Prehistoric - Pertaining to that period of time before written history.

Progeny Site - A test area for evaluating parent seed trees by comparing the performance of their offspring seedlings.

Protection - Any action taken to protect suitable trees from adverse elements such as weather, animals, insects, and disease. Treatments include all practices which increase chances for survival and normal growth of desired tree species.

Public Lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C or acquired lands in any combination.

Public Domain Lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

Recharge - Process by which water is added to the zone of saturation, as in recharge of an aquifer.

Recreation Experience Opportunity - The opportunity for a person to realize predictable psychological and physiological outcomes from engaging in a specific recreation activity within a specific setting.

Recreation Opportunity Setting - Combination of physical, biological, social, and managerial attributes present on a particular land area which influences the experience obtained by engaging in a specific recreation activity.

Reforestation - Reestablishment of a tree crop on forest land.

Regeneration - The renewal of a commercial tree crop, whether by natural or artificial means; also, the young crop itself.

Regeneration Period - The time it takes for a new commercial timber stand to become stocked following the date of a timber sale.

Regulated Forest - A forest comprised of a desired (usually even) distribution of age classes or tree sizes, when the growth equals the cut (at the highest level sustainable) and when the level of growing stock remains relatively constant.

Research Natural Areas - Areas established and maintained for research and education. The general public may be excluded or restricted where necessary to protect studies or preserve research natural areas. Lands may have: (1) Typical or unusual faunistic or floristic types, associations, or other biotic phenomena, or (2) characteristic or outstanding geologic, pedologic or aquatic features or processes.

Riparian Habitat - Those areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics. Includes riparian zones plus one-half the transition zone (or ecotone) between riparian zones and upland habitat. (Inst. Memo OR-80-243.)

Riparian Zone - An area identified by the presence of vegetation that requires free or unbound water or conditions normally found in the area. (Thomas et al. 1979 and Inst. Memo OR-80-243.)

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams, either perennial or intermittent.

Sanitation/Salvage Cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

Sawlog - A log considered suitable in size and quality for producing sawn timber.

Scenic Quality - The degree (high, moderate, and low) of visual harmony and variety within a landscape as compared to other units within the physiographic region.

Scribner Log Rule - A log rule constructed from diagrams which shows the number of 1-inch boards which can be drawn in a circle representing the small end of a log; assumes a 1/4-inch saw kerf, makes a liberal allowance for slabs, and disregards taper.

Sediment Yield - The quantity of sediment, measured in dry weight or by volume, transported in water flowing through a stream cross-section in a given time. Consists of both suspended sediment and bedload.

Sedimentary Rock - A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated; e.g. sandstone, shale, limestone and conglomerates.

Seldom Seen - Portions of the landscape which are generally not visible from observer positions, or areas which are visible beyond 15 miles from those positions.

Sensitive Species - Species not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior or Secretary of Commerce, or according to comparable State documents published by State officials. (Reference Instruction Memo W.O. 80-722)

Sensitivity Level(s) - The degree (high, medium, low) of user interest in scenic quality and concern about possible changes in the landscape features of an area. The two criteria for determining sensitivity levels are user volumes and user attitudes.

Seral Stage - The relatively transitory communities within a sere.

Sere - The whole series of communities which develop in a given situation.

Shelterwood Cutting - A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

Silviculture - The art of producing and tending a forest.

Siphon - A pipe which uses atmospheric pressure to transfer water from one point to another against gravity.

Site Class - A measure of the relative productive capacity of an area for timber or other vegetation.

Site Preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment which is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burning, herbicide or a combination of methods.

Slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

Slump - Rotational failure of a discrete block of soil on a failure plane that is curved from top to bottom and from side to side. The block rotates downward and outward along this failure plane while remaining more or less intact.

Smolt - A young salmon or trout that is migrating from freshwater to the ocean.

Snag - A standing dead tree from which the leaves and most of the limbs have fallen.

Soil - The unconsolidated mineral and organic material on the immeditate surface of the earth that serves as a natural medium for the growth of land plants.

Soil Mapping Unit - A combination of soils, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes of the survey; the basis for the delineations of a soil survey map.

Soil Productivity - The capacity of a soil in its normal environment to produce a specified plant or

sequence of plants under a specified system of management.

Standard Industrial Classification (SIC) - An industrial classification system as defined by the Office of Management and Budget; defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. Refer to lumber and wood products for an explanation of SIC 24.

State Historic Preservation Officer (SHPO) - The official within each State, authorized by the State at the request of the Secretary of the Interior, to act as a liaison for purposes of implementing the National Historic Preservation Act of 1966.

Stream Order - A system of stream classification. Each small unbranched tributory is a first-order stream. Two first-order streams join to make a second-order stream. A third order stream has only first and second-order tributaries, and so forth.

Subsurface Flow - Horizontal movement of water through the soil profile.

Succession - The orderly process of plant community change. Process by which one plant community will succeed another over time given the same climatic conditions.

Surplus Inventory - A temporary (1-3 decades) excess of growing stock over and above that which is necessary to sustain the even flow level.

Survival Cover - Cover required by animals to mitigate effects of a period of severe weather that cannot be met by thermal cover. The objective of survival cover is to provide a forest stand structure which provides shade and cooling during times of high temperature and will intercept snow during severe storms and provide significant quantities of forage in the same stand. Stand closure should be at least 75 percent or more.

Suspended Sediment - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Teratogenicity - Ability of a substance to cause abnormal development of a fetus.

Texture (soil) - The relative proportion of sand, silt and clay (expressed as percentages) in a soil; grouped into standard classes and subclasses in the USDA Soil Survey Manual.

Thermal Cover - Cover used by animals to ameliorate effects of weather. For elk, a stand of conifer trees which are 40 feet or more tall with an average crown closure of 70 percent or more. For deer, cover may include saplings, shrubs or trees at least 5 feet tall with 75 percent crown closure.

Timber Lands - See Forest Land.

Timber Production Base - Acres included in the calculation of the allowable cut (see Intensive Forest Management Lands).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest and base capable of producing timber on a sustained yield basis.

True Fir - A member of the genus **Abies**, e.g., white fir (**Abies concolor**). Douglas-fir (**Pseudotsuga menziesii**) is not a true fir.

Understory Species - Shade-tolerant plant species which characteristically grow beneath the forest canopy; e.g., blackberry and rhododendron.

Unit Resource Analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the resources within a specified geographic area and an analysis of their potential for development.

Visitor-day - Twelve visitor-hours, which may be aggregated continuously, intermittently or simultaneously by one or more persons. Visitor-days may occur either as recreation visitor-days or as non-recreation visitor-days.

Visual Resource Basic Elements - The four major elements (form, line, color, texture) which determine how the character of a landscape is perceived.

Visual Resources - The land, water, vegetation, animals and other features that are visible on all public lands (scenic values).

Visual Resource Management (VRM) - The planning, design and implementation of management objectives to provide acceptable levels of visual impacts.

Visual Resource Management Classes - The degree of alteration that is acceptable within the characteristic landscape. Based upon the physical and sociological characteristics of any given homogeneous area and serves as a management objective to mitigate or avoid adverse visual impacts. Class I provides the highest level of protection for scenic values, and Class IV the lowest level.

Volatilize - To evaporate; to change from a liquid to a gas.

Water Quality - The combined physical, chemical and biological characteristics of water bodies.

Watershed - The area drained by a given stream.

Wetland or Wetland Habitat - Permanently wet or intermittently flooded areas where the water table (fresh, saline, or brackish) is at, near, or above the soil surface for extended intervals, where hydric wet soil conditions are normally exhibited, and where depths generally do not exceed 2 meters. Vegetation is generally comprised of emergent water-loving forms (hydrophytes) which require at least a periodically saturated soil condition for growth and reproduction. In certain instances, vegetation may be completely lacking.

Wildlife Tree - A live tree remaining after timber harvest that can become a snag for cavity dwelling wildlife.

Yarding - The act or process of conveying logs to a landing.

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(June 1984)

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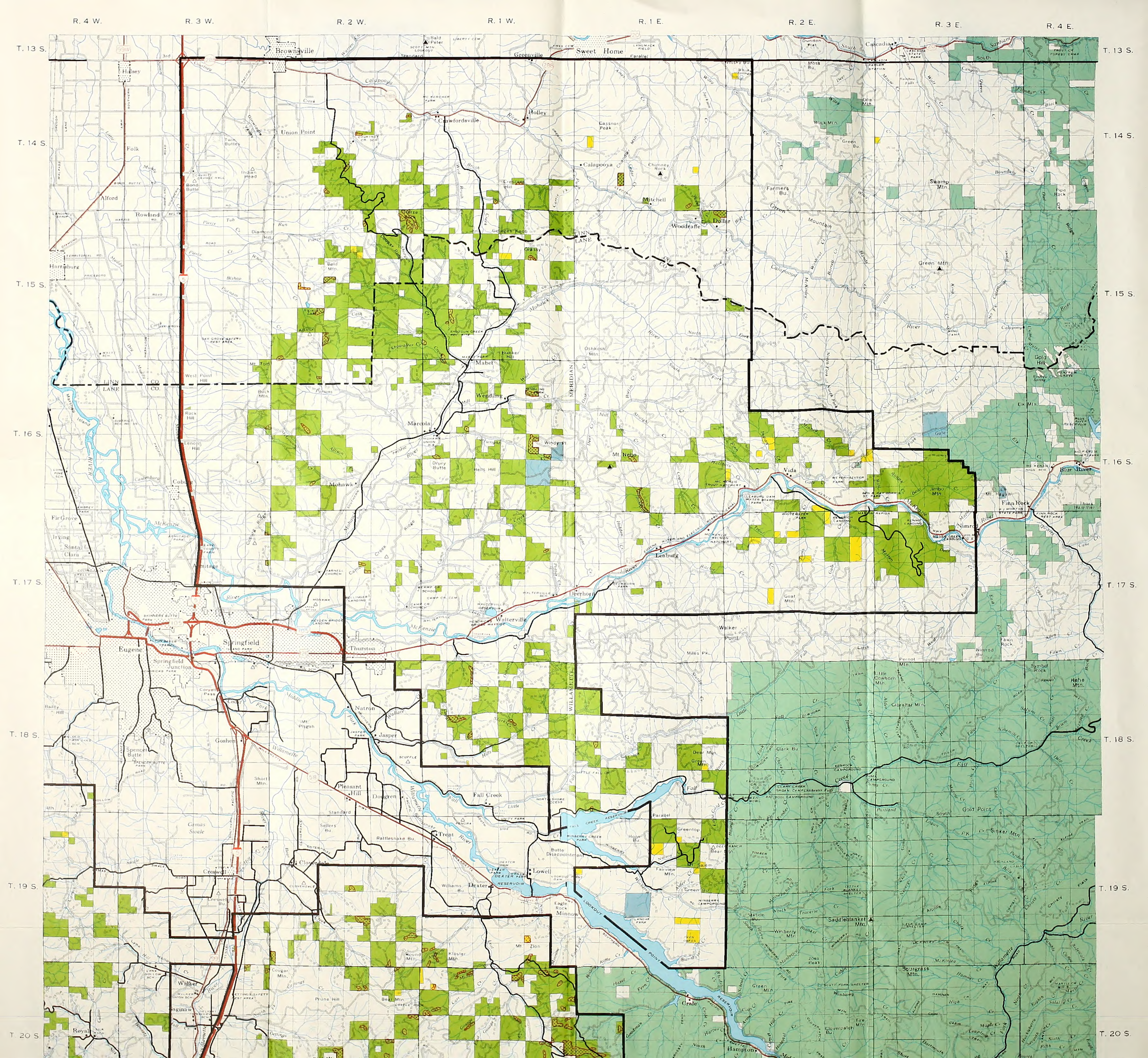
DATE LOANED	BORROWER

USDI – BLM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Woodruffe
Dollar
Mabel
Wendling
Marcola
Mohawk
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Vida
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Finn Rock
Blue River
Nimrod
Leaburg
Deerhorn
Walterville
Thurston
Springfield
Eugene
Goshen
Natron
Jasper
Pleasant Hill
Dougren
Fall Creek
Trent
Lowell
Dexter
Minnow
Creswell
Walker
Royal
Hampton
Saddleblanket Mtn.
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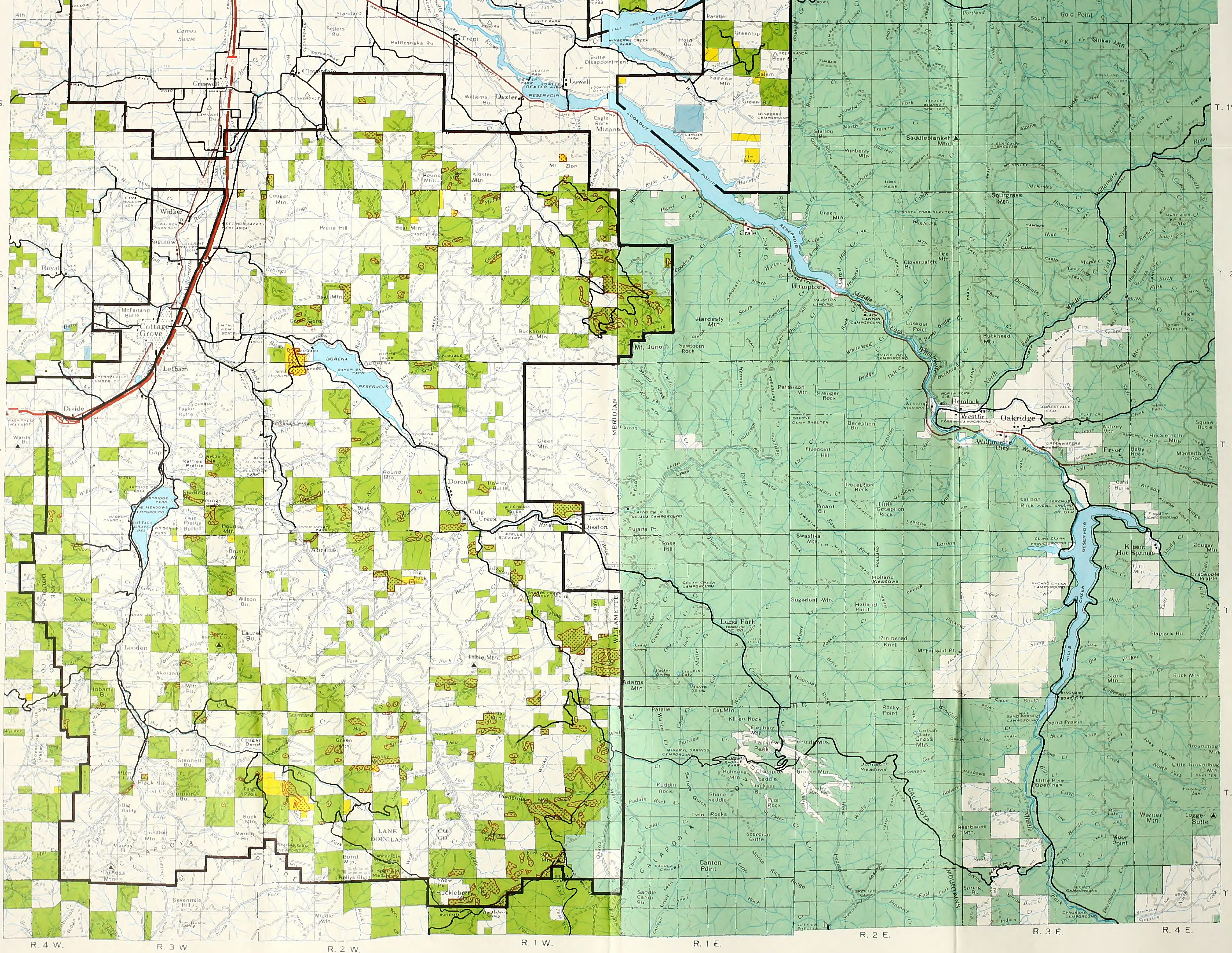

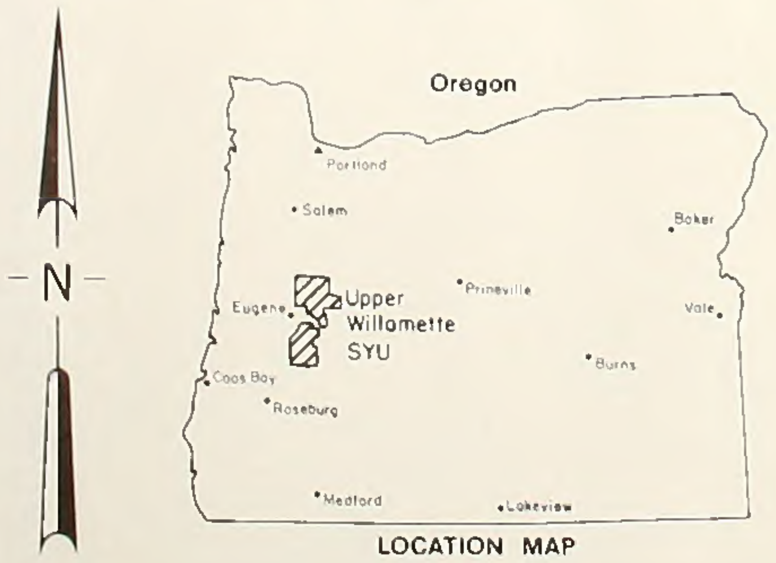

LOCATION MAP

SCALE

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT

UPPER WILLAMETTE SUSTAINED YIELD UNIT

Eugene Environmental Impact Statement Area

1982

LEGEND

INTENSIVE FOREST MANAGEMENT LANDS
- O & C Lands — BLM
- Public Domain BLM

TPCC WITHDRAWN LANDS

U S FOREST SERVICE LANDS

STATE LANDS

- U S Interstate Highway
- U S Highway
- State Highway
- Major Routes of Public Use
- All Weather Road
- Seasonal Road
- Trail
- Railroad
- County Boundary
- SYU Boundary
- Recreation Site BLM
- Recreation Area Other
- Mine or Quarry
- Church
- School

Figure 1-1

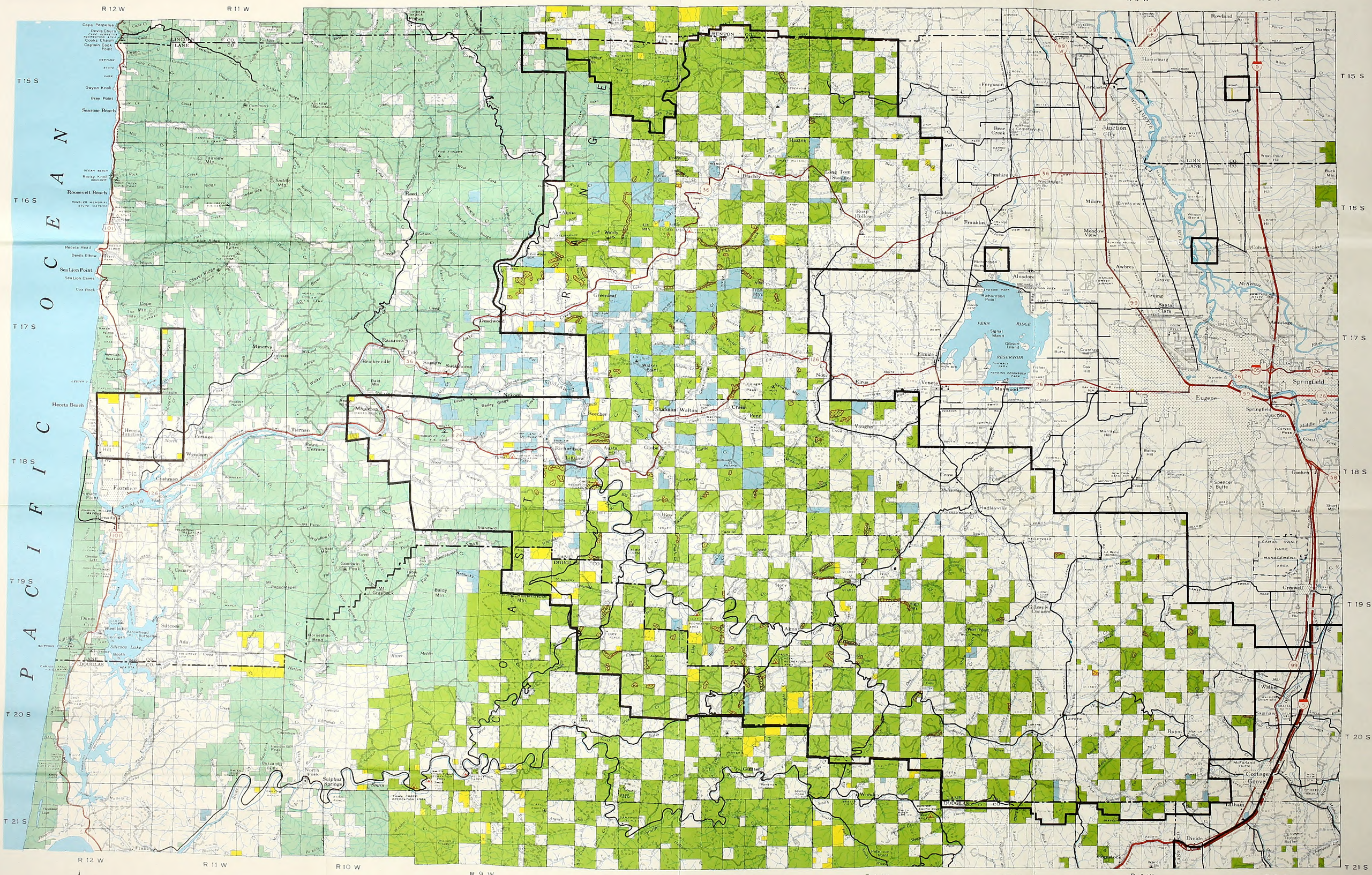

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Figure 1-1

LEGEND

INTENSIVE FOREST MANAGEMENT LANDS
- O & C Lands — BLM
- Public Domain BLM

TPCC WITHDRAWN LANDS

U S FOREST SERVICE LANDS

STATE LANDS

- U S Interstate Highway
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